Engineering Library

MOTOR AGE

Volume XXXVIII
Number 9

PUBLISHED WEEKLY AT THE MALLERS BUILDING
CHICAGO, AUGUST 26, 1920

Thirty-five Cents a Copy
Five Dollars a Year

GENERAL LIBRARY AUG 28 1920 UNIV. OF MICH.

Why Hudson Dealers Prosper

100,000 Super-Sixes in Service

The business success of Hudson dealers is visible.

There is nothing problematical about the profits of a Hudson franchise.

Prosperity is reflected in Hudson salesrooms, which are the show places of the business. It is reflected in the financial well-being of Hudson dealers everywhere. Their status in any community proclaims them men of substance and standing. They are always among the merchant leaders of their locality.

Compare them with other automobile dealers you may know. Whose business has the dynamic drive and power of success? Which shows the greatest present profits and the surest future expansion?

Connection with the Hudson company means certain growth. Backed by the world's largest selling fine car organization with a car, whose record is unequalled for achievement, you will prosper, just as all other Hudson dealers have prospered—if you are of the Hudson dealer type.

You will capitalize the good name, the prestige and the fame of Hudson as part of your local assets. And that is by no means the least important part of a Hudson franchise.

Do you think that with equal opportunity you could develop an automobile selling business comparable to those of Hudson dealers you know?

If so there is a chance for you to secure a Hudson franchise. There are a few openings for the right men. Write today.

Hudson Motor Car Company HUDSON SUPER SIX **Detroit, Michigan**

(H-9)

Entered as second-class matter Sept. 19, 1899, at the post office at Chicago, Ill., under act of March 6, 1879

UTILITY Protected Heaters *for* ALL CARS
UTILITY Jr. *for* Fords

THROUGHOUT the summer—while your efforts have been concentrated on keeping your customers cool—the efforts of an organization on which you rely for substantial winter profits have been concentrated on keeping them warm.

And now that September is practically here, you know the reason why —cool nights, cold days, zero weather to come.

It is time to think of the UTILITY Protected Heaters you need for winter sales—and to consider that in addition to the Utilities you already know, this Fall there is **another** one—a below-the-floor model, for cars too small to accommodate the Foot-Rail type, and for owners who demand a high grade, light, simple heater of the same UTILITY design and efficiency, **properly** sunk below the level of the floor.

This new one is something for you to know about—another UTILITY seller at a moderate price, **with liberal discounts.**

Dealers—Order from your jobber.

Jobbers—Get in touch with us.

HILL PUMP VALVE COMPANY

Mfrs. of UTILITY Protected Heaters, UTILITY Pedals for Fords, UTILITY Pumps, UTILITY Universal Rim Wrenches and UTILITY Universal Wrenches

Belmont and Knox Aves. **CHICAGO**

Sales Department

THE ZINKE CO. **1323 S. Michigan Avenue, Chicago**

MOTOR AGE

Published Every Thursday by

THE CLASS JOURNAL COMPANY

MALLERS BUILDING

59 East Madison Street, CHICAGO

HORACE M. SWETLAND, *Pres.* W. I. RALPH, *Vice-Pres.*
E. M. COREY, *Treas.* A. B. SWETLAND, *Gen. Mgr.*

Member Audit Bureau of Circulations; Member Assoc. Business Papers, Inc.

Vol. XXXVIII Aug. 20, 1920 No. 9

CONTENTS

What Racing Has Taught the Industry 7
Many of the designs and constructions used in racing cars are the fore runners of what we see later on in passenger cars. Racing is not looked upon merely as a sport.

Servicing Employes' Cars 8
The Buick Motor Company has built a service station to take care of its employes' cars. The building is a model of its kind.

Should Factories Make Parts 10
Many cars, trucks and tractors are tied up because of the inability to get parts. This article takes up the pros and cons of the parts situation.

What of the Scrap Tire 11
Being the account of the life of an ordinary tire after it apparently has served its purpose of usefulness.

Testing Aluminum Pistons 13
An Indianapolis motor car concern recently conducted a series of tests on alloy pistons, which revealed some interesting and new facts.

Reclaiming Lubricating Oil 15
Being the second article on this subject and dealing with the co-operation necessary among various factors to attain a desired end.

NEWS SECTION

Bankers Impressed by Truck Tour 19
Five Kansas Cities to Get Truck Lines 21
Electric Lines Alarmed by Motor Busses 21
No Special Rates For Tire Shipments 22
Listing Owners Entitled To Tire Discounts 22
Survey Shows Need of Mechanics 23
N. A. C. C. Sees Replacement Boom 23
Ship-By-Truck Terminal Moves 200 Tons 24
Gasoline Shortage Less Acute 24
Bankers Not Sold On Trucks 25
Hasting Car Deliveries By Boat 25
Good Methods Sell Tractors 26
Seaplane Reaches Detroit 27
Lull In Southern California Sales 27

DEPARTMENTS

Better Business 32
Autogenous Welding 34
Standard Mechanical Operations in Tractor Service 36
The Readers' Clearing House 39
The Accessory Show Case 45
Service Equipment 46
Weekly Wiring Chart 47
The Automotive Repair Shop 48
Bearing Sizes Data Sheet 49
Tractor Specifications 50
From the Four Winds 56

MOTOR AGE

MALLERS BUILDING, CHICAGO — Phone Randolph 6960, Cable Address "Motage"

E. E. HAIGHT, Manager
DAVID BEECROFT, Directing Editor
RAY W. SHERMAN, Executive Editor — B. M. IKERT, Editor

BRANCH OFFICES
DETROIT, 95 Fort St., W., Phone Maine 1351
CLEVELAND, 536-540 Guardian Bldg., Main 6432
NEW YORK CITY, U. P. C. Bldg., 239 W. 39th St. Phone Bryant 8760
PHILADELPHIA, Widener Bldg., Phone Locust 342-343

SUBSCRIPTION RATES

United States, Mexico and U. S. Possessions	$ 5.00 per year
Canada	7.00 per year
All Other Countries in Postal Union	10.00 per year
Single Copies	35 cents

Make Checks Payable to Motor Age

Entered as second-class matter, September 19, 1899, at the Post Office, Chicago, Illinois, under Act of March 3, 1879.

Owned by UNITED PUBLISHERS CORPORATION, 239 W. 39th St., New York, H. W. Swetland, Pres.; Charles S. Phillips, Vice-Pres.; W. H. Taylor, Treas.; A. C. Pearson, Sec.

Another
Popular Item
In the Quick Moving
Dutch Brand Line

DUTCH BRAND
TRADE MARK

Auto Top And Cushion Coating

The demand for an efficient, high grade top and cushion coating is well established. Dutch Brand Auto Top and Cushion Coating meets the demand because it is a quality product in every particular.

This coating gives to old tops and cushions a black, elastic, waterproof finish. Anyone can apply it easily with a soft brush. It is fast color, dries quickly and is suitable for pantasote, leather or mohair.

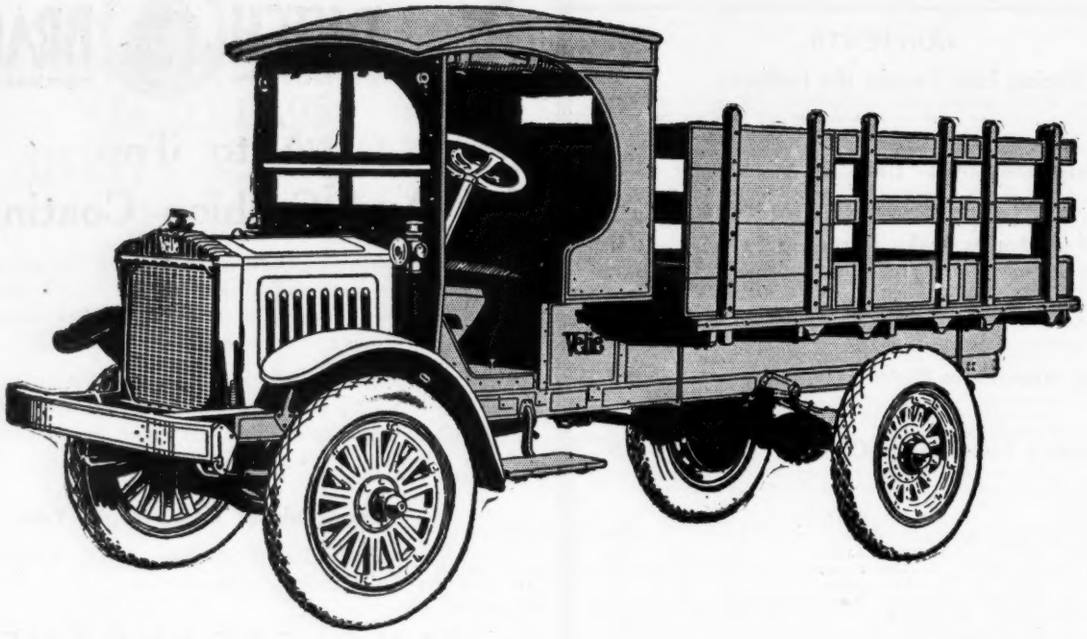
Your Jobber Can Supply You

Write for a catalog of the complete Dutch Brand line of tire and chemical needs.

VAN CLEEF BROTHERS
Manufacturers
Woodlawn Ave., 77th to 78th Sts., Chicago

Makes Old Tops and Cushions Look Like New

Velie Ton-and-a-Half Is a Trade Essential



City business men—Bankers—Farmers—all who use transportation—now recognize the truck as a foremost essential, as necessary as any other equipment.

Velie Ton-and-a-Half is built to meet the needs of the widest range of hauling in the most economical way.

Get the facts about this remarkable truck that fulfills the demands for service—durability—speed—fuel and tire saving—capacity for every kind of load.

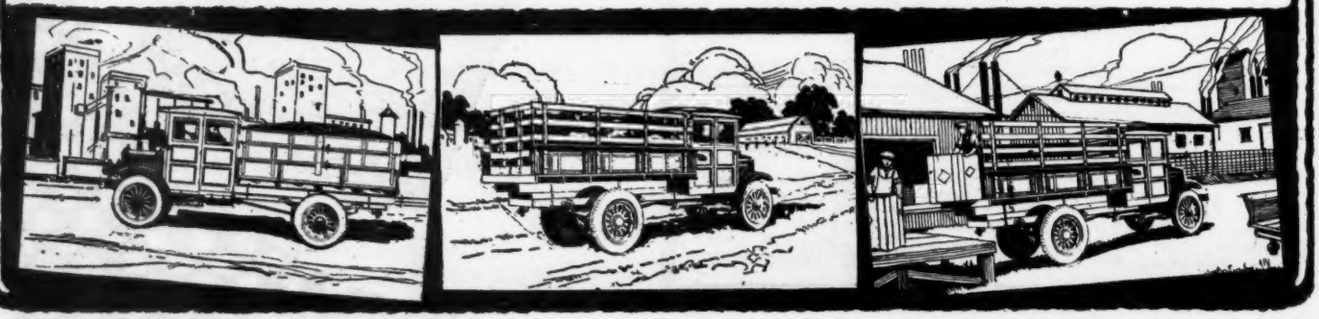
For 10 years the Velie built heavy-duty trucks.

Today all resources of the big Velie Truck factory are devoted to one model only. Why? Because the Velie Ton-and-a-Half covers 90% of all trucking with more speed—with double the service capacity—at half the service cost of horses or heavy trucks.

It is the first truck that brings out all the possibilities of pneumatic equipment. Can do 25 miles an hour fully loaded. New strength! New power! Longer truck life. Bodies furnished for every use. Solid or pneumatic equipment. Velie Ton-and-a-Half has opened a big, fast-selling, profitable market. Write us for details.

Velie Motors Corporation **113 Velie Place** **Moline, Illinois**

Builders of the Famous VELIE Automobiles, Truck and Tractor



MOTOR AGE

THE INDUSTRY LEARNS THROUGH RACING

SPEED Spells safety. It means that a car which can endure the terrific strain imposed upon it, vibration, wear and sustained high speeds will live longer when in daily routine, private owner service.

Speed as we are inclined to think of it in racing annals has inspired the industry. It has found the mistakes in designs and in mechanical constructions. It has contributed its share of development work in the tire industry, in the preparations of steels that go to make up our modern automobiles, in fact, every line of manufacture entering into the construction of an automobile has benefited in some manner from racing.

The race track, whether speedway or road, has been and is the laboratory where experiments are made and the analytical secrets discoverd. Many individuals do not believe in racing, but they must believe in what it has accomplished, and will do in the future. You may be a dealer handling a make of car which never has entered in a racing event, but the chances are ten to one that the steering knuckles on that car are safe because of what some manufacturer through racing has found out about steering knuckles.

Motor car racing has a real financial interest to the dealer. Motor contests of all kinds have a direct interest to him. Such events, with the talk that they always have aroused and the publicity they get keep the motor car before the public in a way no other means can accomplish. Of course, race cars used to-day in the contests sanctioned by the A. A. A. are specially built cars and have little or nothing in common with stock cars bearing the same name. Yet, the manufacturer who races such cars is more than likely to get valuable information as the result of campaigning a set of these cars and which he can incorporate, perhaps in a modified form, in the commercial product.

AUTOMOBILE racing is the great school of progress. One of the best designers of race cars, Louis Coatalen, once said, "The car maker who ignores racing is like an ostrich with his head in the sand—if you don't race you go to sleep and get left in the commercial race. The next best thing to winning a race is to get such a thorough beating that you will sit down and think."

Naturally he spoke from a European view but he gave additional force to his remarks by referring to the passenger car in war. He stated that the only staff cars of European makers which stood up under the extremes of service on the western front were built by men who had raced continuously prior to 1914.

The strain imposed upon the various parts of a racing car during a race like the Indianapolis 500-mile event and the Elgin road race is equivalent to perhaps several years of ordinary driving. Racing has been largely responsible for the advances made in the compounding of steels and the heat treatment of them. In the olden days of racing it was quite common to see cars drop out from broken parts, such as steering knuckles. To-day, it is the exception, although there are, to be sure, cases now and then wher ea car comes to grief from this source, but when traced down it generally resolves itself into poor workmanship or too hasty preparation of the steel.

It is racing which has made it possible for the car owner to drive his engine at high road speeds with the assurance that his lubrication system will function. High sustained speeds in a race mean that the metal of the bearings and that of the crankshaft much touch each other, not for the smallest fraction of a second. Just as long as the film of oil keeps the spinning shaft from contact with the bearing metal, the latter is safe from injury as is a plank an inch off the buzz saw, but let the oil fail for an instant and the shaft cuts into the bearing like the saw into the plank when they are pushed together.

Whether or not the tendency is for a reduction in the size of the engines used in the passenger cars the fact remains that the size of racing engines has decreased, and with it has come practically as great a car speed. This may or may not point to the fact that in the future we may expect to see smaller, but highly efficient engines in our passenger cars, all a result of what has been found out through racing practice.

Similarly we might take such subjects as ignition, carburetion, valve action, manifolding, tires and others and see how each has benefited directly or indirectly by racing. Much of the efficiency gained in engines of to-day, particularly regarding the flow of gases in and out of the cylinders is due to some practice which the designer of a racing car or engine has found would net him many more miles per hour on the race track.

Manufacturers of ignition devices have learned lessons such as only the race track will teach. There are higher temperatures to work against, higher speeds, all the problems of the passenger car are multiplied a hundredfold. The location of the plugs in the combustion is important. The plugs themselves are very important. The plug manufacturer must work with the engine designer to see that proper water space surrounds the plugs, and so must the designers of the many other units that go to make up a race car co-operate with the engine designer or the man who designs the car to insure proper co-ordination of the units. Failure of one of them often is sufficient to throw a car out of a race.

And so we readily can see that this fund of information which racing has contributed to our industry is being assimilated in our daily engineering practice with the result that what we see to-day on the race track we see to-morrow in our passenger cars.

The Elgin road race which was to have been run Aug. 21 will take place Aug. 28. Rain prevented the race on the former date and at a meeting of the officials it was decided to postpone the race one week.

Motor Age will have on hand a staff of writers to cover the race for its readers. It is the first time cars of 183 cubic inches displacement have appeared on this historic track and no doubt there will be many interesting features to record. The track is in the best shape it ever has been and with a field of nine starters — the cream of the racing talent—new records are expected.

How Buick Plant Employes Get Service on Cars

The Factory Service Station is Accepted as the Model for Dealers' Service Station—Cars For Shop Carefully Protected

Cars at the right are being worked upon, while those on the left are awaiting their turn, or are finished. The floor of this factory service station is surfaced with hardwood over a cement superstructure. This makes an excellent floor on which to work and contributes towards cleanliness

IN the Buick factory at Flint, Mich., there are 22,000 employes—men and women who represent families of a number equivalent to the population of a city of 100,000. Just as Buick service stations are established in towns with a population considerably less than 100,000, a special service station for employee-owners of motor cars is in full operation in a modern building within the Buick manufacturing area.

In the last two years, the Buick company delivered to its employees more than 700 Buick cars and it is estimated that more than 1500 cars are now owned by Buick workmen.

The value of motor cars to Buick employees is realized when it is understood that hundreds of them live in the outlying parts of the city and that many more live farther on in the country and adjacent towns.

Many Buick workmen own their homes and hundreds of others have purchased lots on which they are building homes or raising garden produce. Without the automobile, these men and women would be denied transportation between factory and home.

The uninterrupted use of their cars has a significant meaning to them. They are not only relieved from depending on congested street cars within the city but are able to live in parts of the country not reached by either electric lines or railroads.

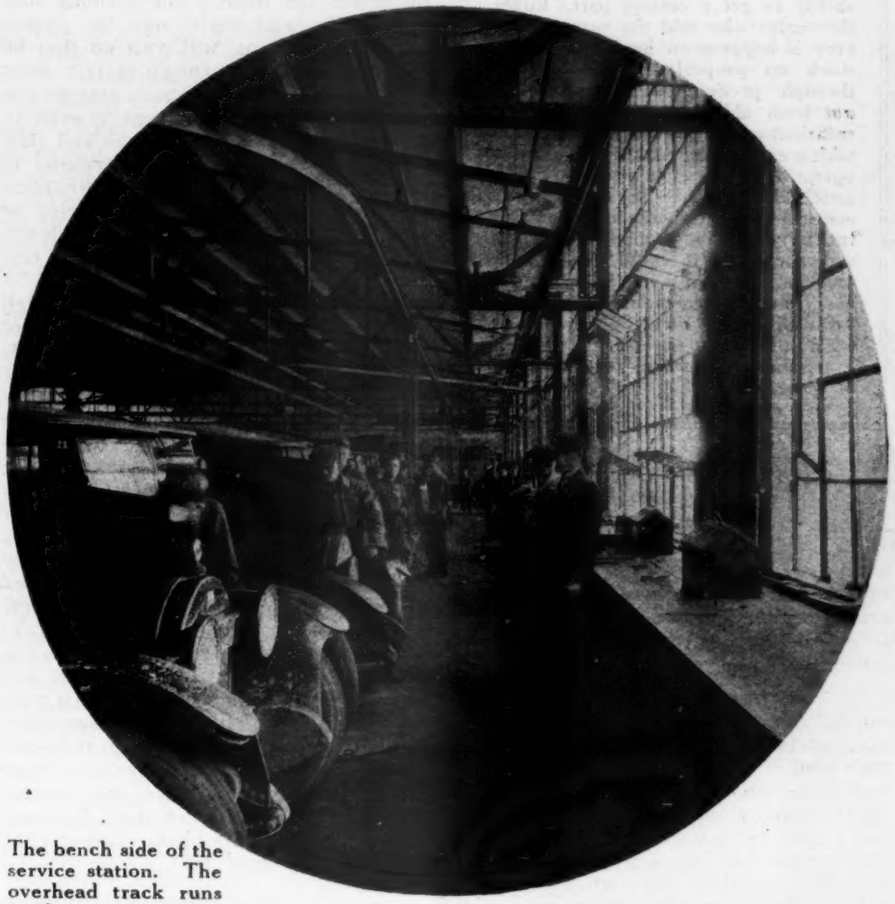
Because it is the policy of the Buick organization to give service to every Buick owner, a brick building, 80 by 300 ft. has been erected and turned over to the service department in order that proper service may be rendered employees who drive automobiles.

The new building represents the latest design and construction in service stations. With its complete facilities, efficient record and cost systems and highly organized management, it is accepted as the model for other Buick service stations in towns and cities throughout the country.

The building is of two stories, the lower floor being devoted to the maintenance of the large fleet of trucks used by the transportation department, while the upper floor, consisting of 24,000 square feet of floor space, is given over entirely to the service station. A large elevator is installed.

This is the service station which the Buick Motor Co. has erected at Flint, Mich., for its employees who drive cars

The immense space used for service purposes is covered by a roof, supported by steel girders, which eliminates posts and makes the entire floor open and clear. Both sides of the building are virtually walled with glass. Steel sash contain 2600 panes of ribbed glass, which flood the workroom with an even, rayless light. For work on cloudy days and at night, a system of powerful electric lamps illuminates the station.



The bench side of the service station. The overhead track runs in the rear as well as the front of the cars

An ideal floor is provided by a cement foundation covered with 2 ins. of sand and 2-in. tarred plank, and heavy hardwood flooring.

Because of the manner in which it is planned and the routine work followed, the service station has an enormous capacity for adjusting and repairing a large number of cars in one day. While the station as erected and equipped primarily to take care of Buick cars only, the establishment has been outfitted to work on other cars, and a complete line of accessories, such as oil and equipment, common to all makes of cars, is carried and sold to employees, who may be driving other cars temporarily.

Two hundred ft. down one side of the station, a line of benches extends, where tools and equipment are kept for general repair work. Only those cars which are actually being attended to are placed on this side of the floor. As soon as a job is completed, or held up for some reason, it is moved to the other side of the floor, and a car that can be worked on is put in its place.

Extending across the end of the building, opposite the elevator entrance, is a large stock room, where parts and miscellaneous accessories are stored. The parts are placed in steel bins arranged in orderly and accessible rows, according to the plan the Buick company has recommended to dealers.

The bins contain more than seventy-five hundred compartments and there are racks to accommodate about seven hundred tires for the various models.

Adjacent to the stock room is the tool supply department where special tools and equipment are kept for workmen. Everything is arranged to get the most out of the available space and to provide ready access to tools or parts at any time.

The service station maintains a complete line of parts, despite the fact that it is near the large parts department. The station is operated as a separate unit and is virtually as independent as any of the thousands of Buick stations throughout the country.

Opposite the work benches are two distinct departments for overhauling motors and rear axles, which are conducted by men trained and experienced in these particular lines.

One characteristic of the new service station is the cleanliness that prevails everywhere. Effort is constantly made to overcome the tendency of grease and dirt to collect on the floor, benches, and tools. The result is that the station is as clean and tidy as any of the Buick plants, where it is found that clean surroundings promote clean workmanship.

Particular care is taken in protecting employees' cars brought in for attention. Clean covers are placed over the cushions and upholstery, and workmen are careful in their work around the car.

The floor is cleaned thoroughly after every job as soon as it is moved out of its stall, and, if necessary, the car may be moved before work on it has been completed.

In addition, workmen's overalls are collected and cleaned regularly.

Another striking point that impresses one is the businesslike way in which an automobile is turned into the station for attention.

An owner drives up to the station and reports that his car needs repairs or adjustments. One of a staff of experienced men looks over the car with the owner and, perhaps, drives it around.

When he finishes his investigation, he makes out a slip, noting the work the owner wants done on the car. The owner signs this and thereby knows exactly what he is to expect when he receives his car. Chances for misunderstanding on the part of the owner or management are greatly reduced and workmen are enabled to proceed with just the work that is needed.

The parts department of the Buick service station. Note the orderliness of the bins

Should Factories Make Parts for Awhile?

There probably are thousands of cars, trucks and tractors tied up in various auotmotive service stations or repair shops on account of the inability to get a certain part. Either the dealer who sold the car or whatever it happens to be has failed to stock up properly, or the factory through production difficulties has not been able to supply dealers in sufficient quantities that would insure taking care of the number of vehicles operating in any certain territory. The article herewith is presented by a concern doing considerable manufacturing work and which makes the statement that it could easily keep one machinist busy making parts for every one thousand inhabitants of the town operating cars. Which simply is a plea for automotive dealers everywhere to check up on their stock of spare parts.

IT WAS Saturday noon and beginning to drizzle as we left the plant, when we were called back by a telephone message (from a former employee) down in New Jersey, some 50 miles. His present job was driving a ——— truck, his reason for calling us was to see if he could get an axle shaft made to replace one that had just broken—get one at any price so long as the truck could be kept going on its 7-day task.

At the risk of seeming egotism, let it be said that our knowledge of the metal working trades is comprehensive and our general experience is broad, so it followed naturally that we advised our ex-employee to get a factory made axle. It was a matter of no surprise, however, to hear that the local dealer and New York and Philadelphia and Boston had been wired to and no axles found nearer than the factory "which can ship in about a week."

Now, ours is not a repair shop. It is a manufacturing machine shop turning out a line of small accurate parts. In addition we build some machinery of about 1 ton weight, for which we sometimes get an order for a repair part for a machine 10 years old or more. We have the tool equipment and the men to do practically anything in the repair line and before the manufacturing end of the business assumed present proportions, we took on a good deal of repair work but now we only do it as an accommodation and then only if there happens to be a man or a machine free for the time being,—which isn't often.

Parts Stocks Depleted

But if we chose, we could keep one machinist busy for every thousand local inhabitants—busy making parts for cars that should be kept running, but can't run because the owners cannot get the right kind of repairs. We know that we could get thisbusiness because we are now turning it away—we are not advertising for the work nor soliciting in any way, except for the reputation earned in the past for prompt, intelligent service and a well equipped shop. And the work that we are now turning away is not being done locally for, while there are several of the old style repair shops about town and the shops of the garages, there is no one nearer than New York, sixty miles away, who has the tools and the men to do this work.

If we chose to go after this business, we could keep our plant going on this kind of work exclusively for we have a wide territory to draw from and the garages would be only too happy to send in the work—it would help the cars they have sold if they can get parts made or repaired right at home and promptly.

But why should we, or anyone else for that matter, put ourselves out for the sake of the automobile trade? The garage around the corner has sold the car and taken their $300 profit on the sale, the new owner buys his supplies from the garage and has minor repairs made from time to time for all of which he pays the usual garage price with profit. Now that one $300 profit, if taken and invested in spare parts, would put the garage in a position to serve the wants of not just one car but a score of them, giving the owners the kind of attention that they deserve and were led to expect would be theirs when they were still in the "prospect" stage.

We find, however, a marked reticence on the part of such dealers to laying in such parts—a reticence as marked as if that kind of stocking up were a liability instead of an asset. They hate to tie up the profit from one sale in what does not appear to be a liquid asset and when Smith burns out the big-end bearing on his new six, they come around to the machine shop and expect you to stop your regular work and pour a babbitt lining in the rod while they wait. But why should we? We got no part of the $300, if we took a man off manufacturing work that would net us $6 a day profit and let him fix up that rod, by the time he had finished and put all his tools away and got back to his other work, the "profit" on the job will have dwindled to a mere dollar. The dealer, having satisfied his customer, pays the charge of $3 very graciously, adding in a benevolent manner that he can get factory linings for seventy-five cents—"but it's all right, I'm glad to pay it."

Such instances are repeated daily in thousands of shops all over the country. Besides the spare parts that the dealer or garage doesn't keep, there are the factory parts that are "temporarily out of stock" and for which the anxious owner may wait months to come in stock plus the transportation time over a thousand miles of railroad. It is significant that at the same time that garages and factory are out of parts, one can buy as many new cars right off the floor as there are waiting customers.

Why this aversion to stocking parts on the part of the dealer? Why this indifference to customers' needs on the part of the factory? Why are dealers permitted to handle cars without a compulsory stocking of parts in proportion to the number of cars named in the contract—these are of the mysteries of the business. Car owners get in touch only with their local dealer and he, pinned down to the point, will own up that he "makes only 15 per cent on parts." Only 15 per cent! Most of his customers are satisfied to make 15 per cent or even 10 per cent on their own business and they can't "get" the attitude which spurns 15 per cent on a small sale—their mind travels back to the purchase price of their car which they know included a handsome profit for seller and the factory both.

The price charged for parts is high enough, everyone in other branches of the machine business knows, to make it worth while to manufacture parts for profit. The scarcity of them cannot be laid to working conditions so long as new cars are being turned out. The case has been the same through pre-war and post-war and war times. There is getting to be a well grounded belief among the public generally that factories should cease the manufacture of new machines for 1 or 2 months and make ample stocks of parts, then compel their dealers to absorb them.

Take Your Money—Then Look Out

Some days as many as a dozen persons will come into our place with troubles and every one of them is "sore" at garages and manufacturers. "They are ready enough to take your money for a new car, but after that—look out for yourself!" is the usual parting after we have explained that we do not do such work.

A local doctor had purchased a $4000 car after much assurance from the garage man that it would end car troubles and expense for many years to come—a really high class car, whose reputation was well upheld by the dozen cars already sold in the community. In a few months, a universal member went bad—one of those unavoidable things that somehow get past the inspectors in the factory. "No, we haven't one in stock," said the dealer—"we never had one called for before but we can get one from the factory in 3 days." Naturally there was to be no charge for the piece, but the 3 days stretched out to 2 months because the part was temporarily out of stock. And when it arriver, it had a ⅞-in. hole instead of the 1⅛ in. square as in the original; that was how we came to see it—they wanted us to enlarge the square—but we turned it down, partly because of other work and partly because of the uncertainty of heat treating an unknown steel.

The present slump is a mere trifle to the one which will occur when the automobile buying public is fully aroused to the shameful treatment it receives from dealers and factory alike. The "direct factory branches" in the big cities are often fully as bad as the small dealers.

(*Continued on page 16.*)

What of the Scrap Tire?

Being An Account of the Life of an Ordinary Tire After It Apparently Has Served Its Purpose of Usefulness on the Motor Car

WHEN an old tire is relegated to the junk pile many people consider that its life is ended. As a matter of fact it is only half over.

One chapter is finished but there is another still to be lived. The second is just as long and much more interesting and varied. Such a tire is known as a scrap tire and is a somewhat misleading term, in that it pictures tires that are good for nothing except for the rubber that is in them. However, when compared to new tires the term becomes fairly accurate and this is the sense in which it is used.

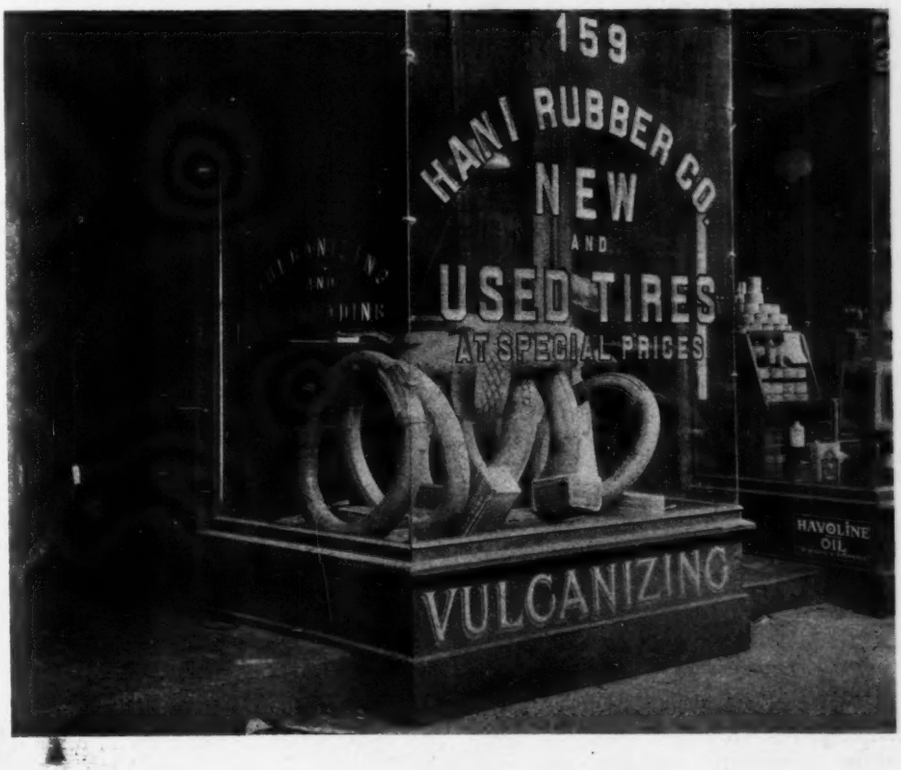
The pivot point of the scrap tire industry is the scrap tire dealer. In various ways the tires gravitate to his warerooms where they are carefully sorted and sold to those who have uses for the different grades. The term scrap tires, it should be explained, includes not only those which come from individual owners but also spoiled, mutilated and adjusted tires from factories.

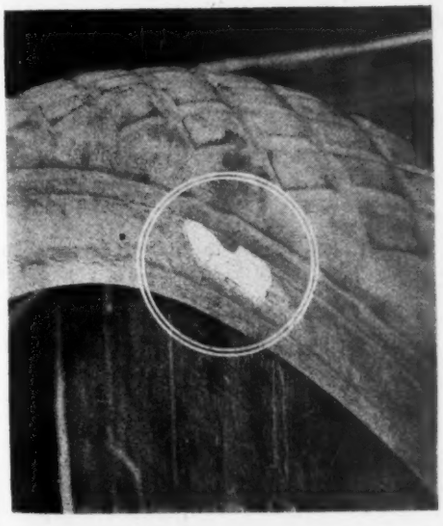
There are relatively few scrap tire dealers—far less than would be exexpected. In New York, for example, there are only two that squarely meet the definition. Likewise there are two or three in Akron and Chicago, two in Philadelphia, and these are about all there are in the territory embracing the East and the Middle West.

When a motorist sells an old tire to a passing junk collector it usually goes through several hands before it reaches the scrap tire dealer. The collector, when he has accumulated a load of assorted junk, sells it to a junkman who possesses a yard. For lack of a better name let us call this man a wholesale junkman to thoroughly distinguish him from the junk collector. The collector's load consists not only of old tires but the usual aggregation of scrap metal, paper, broken furniture, etc. The wholesale junkman deals in all these things so that tires are just one of many lines. This man may sell direct to the scrap rubber dealer if there is one in the locality but more than likely there is not and so he probably sells the tires to another wholesale junkman who deals only in rubber and this man turns the tires over to thet scrap rubber dealer.

In some respects this organization of the business resembles the usual manufacturer-to-consumer organization where the path of the goods is: Manufacturer to jobber to retailer to consumer. There

We know that when we sell a junk man a bag of rags or old newspapers he is going to resell them in order that they might be remade into paper. But what of the scrap tires we sell, often for 3 cents a pound? There are various ways of disposing of an old tire and sometimes when a car owner or dealer has been led to believe a tire has gone its limit, such a tire, or at least part of it, is made over, so that the new product might go again as far as before. This article tells all about the life, or rather, the after life, of a tire and should appeal to those whose daily work brings them in contact with old tires.

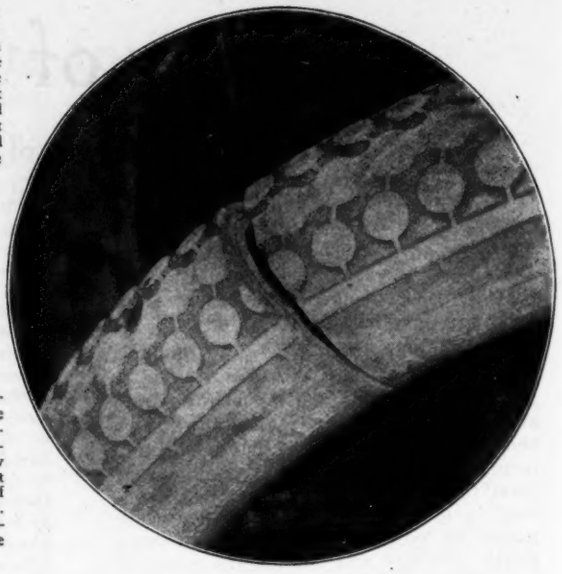




The store front above illustrates the sort of place the successful tire repairer maintains. The lettering on the window advertising new tires at special prices. The interior is crammed with tire stock leaving practically no space for selling

To the left a splendid example of a repairable. This tire ran a thousand miles or so when it blew out in the side walls as shown. This tire will be bought by some man dealing in repairables, and mended so skillfully that it will be difficult to detect the repair, from the outside at least. Inasmuch as the repair will be unconditionally guaranteed such a tire is usually a good buy since it is probably flawless except for the one defect

The tire to the left is what is known as a good top. The defect lies in the bead on the far side. This tire blew out right above the bead and its repair is not practicable. But the tread is perfect. Consequently it may be placed over a sound carcass after the beads are removed.



The aristocrat of repairables. A perfectly good tire which was cut at the factory to determine the efficiency of the cure. It may be repaired so that this cut will be almost impossible of detection from the outside. Such a repair is only feasible when the beads are intact.

is this difference, however, the lines of demarcation are not drawn so tightly. In the case just mentioned the manufacturer will not sell to the retailer nor customer but to the jobber only. The jobber will do business only with the retailer. But in the junk business every man is out to do all the business he can, wholesale or retail.

The scrap tire dealer who buys tires by the carload and often sells the same way, will not hesitate to dispose of a single tire to the individual who comes for it and the same applies to the junk collector and the wholesale junkman. Often the junk collector will submit his daily load to some one who is in the market for scrap tires of a certain type, a retreater for example, before he drives on to the wholesale junk man.

The latter sells tires as opportunity offers before passing the bulk on to the wholesale junk man who specializes in tires or rubber. It is rarely that either of these men will sort the tires although in some cases the latter does. Retreaders, used car dealers, individual car owners, adjustment gyps and many others in the locality may inspect the changing stock of either of these from time to time and select whatever tires appeal to them.

Just where along the line the more desirable tires are disposed of is a matter of opportunity. In some instances quantities of tires will reach the scrap dealer practically unculled and then again the tires offered to him may be so thoroughly picked over that he may refuse to buy them, in which case the junkman wholesaler sells them to a reclaiming company. The latter recovers the rubber, for which there is a varied demand. It is used largely in making rubber doormats and similar articles, for rubber insulation and for compounding with new rubber in connection with tire manufacture. It is a fact not generally known that practically all tire makers, even the best, use a certain amount of reclaimed rubber in new tires. It is claimed that this rubber not only is not detrimental but actually beneficial in many respects. A parallel case is found in the iron and steel industry where scrap material is greatly desired for compounding with new metal to attain certain results.

When the motorist is offered 2½ to 3 cents for an old tire he is likely to resent it, feeling that the collector is imposing on his ignorance or taking advantage of the fact that he knows of no other way to dispose of it. However, the profit exacted by any of the men through whose hands the tire passes is only a fraction of a cent a pound and usually this profit is obtained by reason of the higher price obtained for some of the tires in the lot. It is quite possible for the price per pound to remain stationary throughout the cycle. For example, let us say that the junk collector obtains a dozen tires from various motor car owners during the course of a single day and that he pays 3 cents a pound for them. He sells 11 to the wholesale junk man for 3 cents but the remaining one is taken by a local retreader for 10 cents a pound. The weight of the average worn tire is about 15 lbs., so he makes a profit of 7 times 15 cents or $1.05.

How Tires Are Bought

Because one car owner received only 3 cents for a tire that was worth 10 cents a pound it should not be concluded that injustice was done him. The fact that the car owner does not know a 10-cent tire from a 3-cent one and would not know where to sell it for 10 cents if he did know it was worth it makes the service of the junk collector worth the money.

The wholesale junkman has paid 3 cents a pound for eleven tires bought from the junk collector. He may purchase a couple of dozen more during the day, say thirty-five all told. He sells, we will say, three tires out of this lot for 6, 11 and 15 cents per pound respectively. At 15 pounds per tire therefore he has made a total profit of $3.45 on this phase of the day's business. This is only reasonable considering that there is a large amount of handling, not to mention any sorting he may do. They must be weighed and paid for when received and weighed and perhaps delivered by truck or loaded onto a freight car when sold.

In general the junk collector makes the greatest profit per pound but he handles few tires; the first wholesale junkman gets a smaller profit per tire but handles more tires and this is increasingly true of the second wholesale junkman and finally of the scrap tire dealer.

The second wholesale junkman, the one specializing in rubber, may also buy and sell for 3 cents, taking his profit in the higher price he receives for tires that are culled. It is true that the most valuable tires may have been picked out before he receives them but he is handling relatively large quantities and depends on volume for his profit.

When the scrap tire dealer gets a load of tires he sorts them very carefully. Perhaps he has also paid 3 cents for the lot. If the tires have not been culled before reaching him he may find some that are worth 25 to 35 cents per pound although the average of those he sorts will sell for less than 10 cents. The majority of the tires are probably rejected as worthless and these are sold to a reclaimer, perhaps for 3 cents a pound.

The different grades or classes into which the tires are sorted is about as follows, although this may vary according to the demands of the customers and the judgment of the dealer:

1—Repairables; good tread and carcass except for a repairable defect—usually a blowout.

2—Bottoms or inners; defective or worn tread with (a) no blowouts, (b) one blowout, (c) more than one blowout. Must have no rimcut or bead defects unless repairable and fabric should be sound.

3—Good tops; tread slightly worn, tires with rimcuts or bead defects. Used for double tire retreading (sewed on).

4—Reliners; tire with sound fabric but bead or rim defects, worn tread, not more than one blowout.

5—Adjustment tires; tires that a gyp can obtain an adjustment on.

The scrap rubber dealer also buys carloads of scrap tires from the tire manufacturers. These include tires that

(Continued on page 17)

New Type Aluminum Piston In Cole

Trials at Indianapolis Motor Speedway on July 29th and 30th Under A. A. A. Sanction With Cole Aero-Eights Demonstrate Unprecedented Results. C. S. Ricker in Charge

IN a series of official A. A. A. Tests at the Indianapolis Motor Speedway, three stock Cole Aero-Eights, with less than 50 miles of road limbering, established standards for uniformity, interchangeability and efficiency in piston design.

The tests, according to A. A. A. officials are unique in motor car history and are of vital importance.

The object of the tests was to prove that a new type of aluminum piston developed by Cole engineers and already in use on over 1700 Cole "Aero-Eights" was not only interchangeable but could be fitted so tight that it would not "slap" and yet was loose enough so that it would not stick when the car was run at a maximum speed for a considerable period of time.

Stock Cars Used

To make the tests representative of the character of the Cole stock product, three standard touring cars, selected at random, were taken from the floor of the Lathrop-McFarland Sales Co.'s show room in Indianapolis, and driven out to the Indianapolis Motor Speedway on the afternoon of July 29th. At the completion of tests, these cars were carefully checked against the A. A. A. stock car description blank.

An aluminum piston capable of installation with wide tolerances in machining, giving freedom from piston slap and oil pumping, and without the atendant seizing from too close fitting has long been the desire of aluminum piston makers. The aluminum piston business has been given a bad name, because in the past there has been much difficulty experienced from oil pumping and piston slap. These difficulties are being rapidly overcome and we find now that close fitting pistons are possible.

The cars were taken to the Speedway in the afternoon of July 29th. Tests were first run for ½ mile at 10, 20, 30, 40, 50 and 60 miles per hour to check the uniformity of the speedometers. Then a series of six acceleration tests were made with each car, three tests on one side of the track and three on the other to average up any difference due to variation in the direction of the wind. At the completion of these tests the cars were locked up in the garage of the Allison Experimental Company by the A. A. A. officials.

Mix Pistons Up

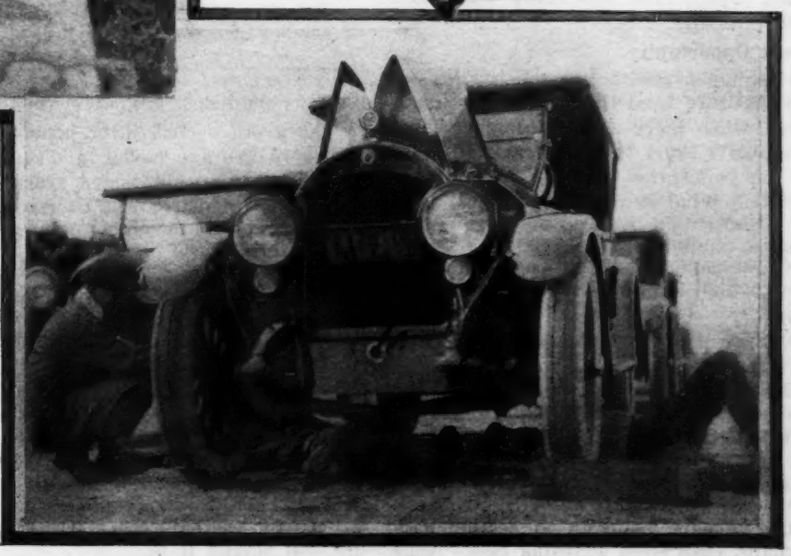
On the following morning the three cars were driven back to the Speedway where two mechanics on each car proceeded to remove the pistons from each engine. This required the removal of the connecting rods as well as the pistons. By noon all pistons had been removed.

An arbitrary chart was made showing where each piston should go and so

(*Continued on Page 29.*)

A few views during the tests on the Cole

To the left, "Howdy" Wilcox, winner of last year's Indianapolis race; W. C. Buser, center and Chester S. Ricker.



What Is Wrong With Present "Automobile News?"

Comment on a Recent Article Which Appeared in This Publication on Dealer Publicity

DENVER, COLO., Editor MOTOR AGE: The article in MOTOR AGE of July 1 under the title "What Is Wrong With Present Automobile News?" has just come to my desk and I cannot refrain from advancing a few thoughts I have had along this line for several years past. The action of the New York papers to my way of thinking, is one of the best things which could have happened, because it is sure to cause discussion of a subject which is sadly in need of discussion. While the New York automobile men may feel that they are injured parties, they will eventually find they will benefit.

I once handled the sport page of a newspaper which a new owner was trying to build up in circulation. I ditched everything in the nature of syndicated stuff, and used only hot news off the wire, and fresh comments of events of national importance. For the rest I used the first hand news collected on a daily run, followed as conscientiously as were the police stations and courts.

There was a group in town interested in chess and checkers; another bunch owned horses which they put around the track on Saturday afternoons for their own pleasure; there was a group interested in canoeing and handling small sail craft; there were many things of this nature in addition to professional and amateur baseball, prize fighting, etc. I made it a point to cover all these things. John Smith had gone to Kentucky and bought a new pacer; Bill Jones was building a new cat boat of certain specifications; there was always something doing of interest to a certain circle. When all of these appeared in a paper which took the trouble to go out and find out about them, that paper enjoyed an unusual growth. The publisher told me that his circulation was built on that sport page. That was many years ago. ago.

Great Opportunity

How much greater the opportunity today, figuring from the publisher's standpoint, when there is something in which practically every man, woman and child in the country is interested—the automobile. What a wonderful opportunity for co-operation between the dealer, who desires publicity of the right sort, and the newspaper which desires to publish news which is of interest to the general public.

Denver has two Sunday automobile sections, each of eight or more pages. They publish practically no news—the the erection of a new building or something of that sort. But there is, in Denver as in all other cities, more real news breaking because of, or through, the automotive industry and its products, only real news being in connection with perhaps, than from anything else. None of it is published. What is the reason?

The average city editor, and we must speak in average terms in discussing a matter of this kind, is ten years behind the times when it comes to a consideration of the automobile industry. He thinks in terms of "game." To him it is still a joy-riding, life-taking vehicle which is of no interest to him unless it kills some one. This is evidenced the fact that the killing or injuring of some unknown person entitles the story to a two-column head. The same person killed or hurt in any other way—unless the circumstances be unusual—would be worth less than a "stick." It is the fact that the automobile did the damage, and this is purely a hold-over in his mind from the days when it was all that he still thinks it is.

He has maintained his routine year after year while the automotive industry has outpaced him. If Washington proposes that fifty thousand of his readers be taxed 10 per cent on their automobiles he sees nothing in that which has any news value. Events of interest which turn up every day in the many garages about town are of no consequence to him. He sends a reporter to the justice court to learn that Bill Smith sued Bill Jones for $25 and publishes that fact. It never occurs to him that he could establish a run to cover the larger garages which would turn up story after story of real human interest; that comments of prominent people en tour would boost his city and state; that he could supply his reading public with experiences and data which would be of great interest and education to them.

Dealer Not Publicity Man

The dealer in automobiles would be best served if his present line of "publicity" could find no place in print. The dealer, himself, is not a publicity man. He has no nose for news. Story after story of real interest goes in and out his door every day while he works the wires to get a lot of factory "publicity" into the newspapers. He is quoted as advocating the use of a certain wax which his accessory store handles and everyone who uses it ruins his automobile. He is made the author of the statement that you should paint your own car at home; and all sorts of impractical statements which are not read, and react upon the industry as a whole. You have ably covered this phase in your article.

In this, as in a great many other features, the automobile industry is passing through a great change. The war brought reforms over night which, under normal conditions, it would have required years to effect. The business has stepped into the ranks of primary industries, essential to the business and social life of city, state, and nation. It must be dignified business. The sort of publicity it has had has been so patently "bull" that it causes the reader to turn up his nose at an industry which would sponsor it, rather than to influence him in the purchase of cars.

Every man is an owner or a prospect for an automobile. What they want is information—which is another name for **real** news.

As one who is sincerely interested in the automotive industry for what I believe it to be—the greatest and most important in the world—I am more than glad to congratulate MOTOR AGE upon bringing such questions before the industry. For such things are FUNDAMENTALS.—P. E. Chamberlain, general manager, R. R. Hall Cadillac Co.

At a conference in New York in July between representatives of the automotive industry and newspaper publishers the question of automobile publicity was taken up for consideration. While the entire matter was not definitely settled each side set forth its views and it was agreed that some change in the news published in the daily press must be made. The representatives of the industry admitted that the character of the publicity emanating from them had been bad and the publishers on their part stated that the sections of their papers devoted to automobile news had been handled in such a way as to permit evils to creep in for which neither the dealer nor the manufacturer was responsible. The decision was made, however, that there would be no more attempts to get free "puffs" which have no merit as news and that such attempts should receive scant courtesy from the publishers. At the same time it was held that there is a great deal of news that could be published legitimately. A subsequent meeting will be held to listen to concrete proposals from both sides.

The Denver Cadillac Company is one of the most successful dealer establishments in this country. The specialty of this organization is SERVICE sold on a basis whereby it becomes a commodity like any other merchandise. Because of the well earned reputation of this concern it is well to read what P. E. Chamberlain, manager of the Cadillac-Denver Co. has to say concerning automobile news.

Conserving Oil Supply Through Cooperation

Manufacturers should design for accessibility and for an oil that can be produced in large quantities. Some present designs require an oil that must be made at a sacrifice of fifty times its amount in other grades. Oil producers should co-operate with the manufacturer in solving his lubrication problems and supply the oil required. Dealers should advocate oil reclamation, demand changes in design to gain accessibility and educate the consumer to economically care for the lubricating system

BY G. REX VOLZ

SOLUTION of the lubricating oil problem can be accomplished only when the seriousness of the decidedly unbalanced and wasteful condition is realized, and when the discordant factors are co-operated and an active educational campaign is carried out.

There must be an understanding between the manufacturer, the oil producer, the dealer, and the consumer.

At the present time it is agreed by all of the oil men that there are about four grades of oil, namely, light, medium, heavy and extra heavy. These names are terms applied to represent the oil body, or in other words its viscosity. These classes of oil mean practically nothing because there is no adopted standard that keeps them confined within certain limits and the oil men are pulling apart instead of cooperating. It is only natural that the dealer is going to buy the oil he can sell to his patrons and on which he can make the most money. But why, when dealing with a rapidly disappearing asset, carry on competitive methods and allow the waste to go on? Why not get together and adopt some standards and educate the consumer to the necessity of conserving the oil supply?

Comprehensive Saving Needed

The car manufacturer has learned to conserve the oil and in many cases reclaimers have been installed. However, he might go further than that. He might change the engine design so that the car owner will have an easier job changing the oil in the crankcase. Some suitable valve, such as illustrated, might be provided so that the operation of oil changing will be easy.

Crankcases also could be designed with fins to give better cooling and should have greater oil capacity so that the oil will have a chance to be at rest in order to settle the impurities. Engines must be designed to use the oil that can be produced in large quantities. It is to be admitted that there are some oils that will have properties that are better than others but in all such cases one will find that this oil is being produced in limited quantities. In the case of emergency it would be impossible to secure enough of these grades of oil. Consequently we must have designs that can use other grades of oil.

When the car manufacturer has designed his engine and specified the grade of oil to be used when the car comes from the factory, the oil man should know what kind of an oil the manufacturer is talking about and what body it should have. This means that it will be necessary to adopt oil standards with well defined limits to fit the nomenclature of the oil. The wide variation in body of the different oils of the same nomenclature being produced by some of the largest oil producers is clearly shown in the following table:

	Vicosity in Sec. at 100 deg. Fahr. Oil Grade		
Oil Sample	Light	Medium	Heavy
1.	132″	201″	800″
2.	135	191	307
3.	—	235	270
4.	160	215	235
5.	210	250	320
6.	176	210	350
7.	170	220	—
8.	180	235	371
9.	180	191	275
10.	145	295	370
11.	157	301	380
12.	191	245	350
13.	158	269	721
14.	135	194	281
15.	176	210	265

These oil samples have been taken at random and simply are used to show the existing conditions. Compare this table with government specifications given below. Note that there are very few oils that are within the standard limits.

Government Specifications

Oil Grade	Viscosity Limits at 100 deg. Fahr.	
Extra Light	140″	160″
Light	175	210
Medium	275	310
Heavy	370	410
Extra Heavy	470	520

Another illustration which will show the lack of cooperation and understanding among the oil men is a comparison of the oils recommended for use in a Diesel engine by various oil producers. Blue prints, photographs and a complete technical description of the engine was sent to all of the oil producers with a request that they recommend oil for use in this engine and submit a sample to be tested. Tests show that the variation in viscosity at 100 degrees Fahr. was from 136 sec. to 4500 sec. which means that they covered the entire oil field from the very lightest to the extra heavy. During the war they found a wide variation, given in the following table. These examples clearly show that a set of oil standards is absolutely essential and must be adopted.

Viscosity of Oils in Air Service

Oil Sample	Viscosity at 100 deg. Fahr.
1.	1774″
2.	340
3.	900
4.	1258
5.	1333
6.	1691
7.	1224
8.	1095
9.	2370

The dealer must be educated to understand the lubrication requirements as laid down by the manufacturer and the oil man, as it is up to the dealer to educate the consumer. In educating the consumer the chief factor to overcome is indifference. The average car owner does not appreciate what is taking place in the engine, consequently he does not know what grade of oil to use or when the oil should be changed. In many cases it is left entirely to the dealer or service station mechanic. In the past some have always held the contention that one grade of oil would suffice for the entire life of the car. This, however, is not the case.

There are constantly changing conditions in the engine which makes it necessary to have several grades of oil for use. When an engine is new the parts

Co-operate and Save Oil!

Individual waste is a seemingly small item and is responsible for the lack of appreciation of the vast amount of waste going on. A car owner changes the oil in the crankcase about twelve times pe ryear and in so doing throws away about 24 gallons of oil. At a price of $1 per gallon this is a rather small item when extended over a period of one year. Collectively, what does this mean? Since 1916, 5,818,449 new engines have been built for automotive use. On this basis if the oil is changed once a month, which is a fair average, we are throwing away 139,642,776 gallons of oil.

In addition to the lubricating oil that is wasted it is interesting to note that the oil when drained contains about 25 per cent gasoline. At this rate 34,910,694 gallons of gasoline also are thrown away.

to be lubricated are very accurately fitted and the body of the oil to be used to properly lubricate these parts is always specified by the manufacturer. Now take the car and run it for say 5000 miles and what condition are these parts in? During this period of operation a certain amount of wear has taken place due to the dilution of the oil and the accumulation of dirt and oil that forms a regular lapping compound. This wear means that there is a certain clearance or gap which should be taken up and this can be accomplished by the use of an oil of a heavier body. The owner must be taught to take proper care of the lubrication system and still not be wasteful.

The development of cheap reclaimers only can be brought about by proper organized demand. The dealer should awaken and begin to see that we cannot afford to waste any of our petroleum products. He must advocate oil reclamation and force the development of oil reclaimers. There are two possible ways to handle an oil reclaiming business successfully, viz.:

Collect the oil, reclaim it for a certain price per gallon and return it to the owners.

Collect the oil and allow a certain discount on the new oil used by the owner.

Both of these systems have been tried and proved satisfactory. It might be well to go still further and create demand for a small reclaimer for the use of the individual car owner. The importance of oil reclamation has already started the development of a small reclaimer on every car.

Cooperation of the factors cannot be accomplished as long as all concerned ignore the facts that conservation is absolutely necessary. The time is here perhaps when we should start an educational campaign before we deplete the stocks of lubricating oil.

The Story of the Scrap Tire

(*Continued from Page 12.*)

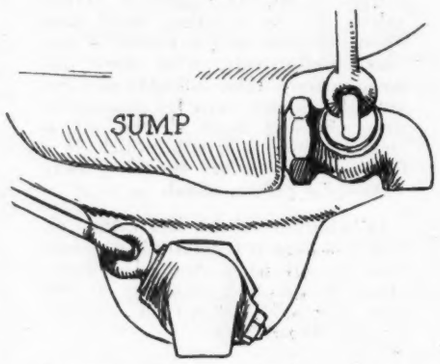
have been returned for adjustment and tires spoiled in process of manufacture. These tires are similarly classified and often are mixed with the scrap tires obtained from the junk yards—if a tire meets a certain specification its previous history is not of interest. The factory tires, however, usually bring a higher price because they are newer and regardless of the use to which they are to be put this is generally an advantage.

Repairable tires are ones that have sound carcasses and good tread except for repairable defects such as a blowout, small section of loose tread, practicable bead repair, etc. Certain tire repairmen specialize in tires of this type, guaranteeing the repair. These tires wear well and are a good investment when purchased from a man who will stand back of his guarantee. The tread repair is usually so skillfully made that it is rather difficult to detect.

Such tires are rarely obtained from the junk dealers but usually are received from the manufacturers. Often they are tires that have been adjusted. Sometimes they are tires that have been spoiled in the factory. The spoilation may be accidental but often is intentional, the tread of the tire or the bead or both being cut to determine the effectiveness of the cure. Many such tires bought by the scrap rubber dealer from the tire manufacturer are so badly mutilated as to be beyond repair. These must be sold to the reclaimer for 2 to 3 cents per pound whereas the price paid for factory scrap is usually 6 or 8 cents.

Best Retread Tire

The best tires for retreading are those which have been returned to the factory for adjustment because of mold pinch or faulty tread cure. It is usual to vulcanize a tire in its manufacture in a two-piece mold. Carelessness on the part of the workman may result in pinching along the center of the tread when the mold is applied. When the cooking



A suggestion for a simple and easy way to drain crankcases

of the tire in the mold is completed the defect is not noticeable. However, the tread foundation has been so distorted that a certain amount of running, perhaps 50 miles and perhaps 1000 miles, will produce a crack in the tread rubber. This fact naturally greatly reduces the life of the tire and is a basis for adjustment. In ninety-nine out of one hundred cases the fabric or carcass of the tire is perfect. It is rarely that the pinch extends in far enough to affect the fabric. Such a tire is ideal for retreading since the carcass is practically new and without blemish.

Tires with tread defects—adjusted because of rapid tread wear—are equally good since they are also comparatively new and unblemished.

Adjusted tires that have blown out and have worn treads are also good for retreading. If the treads were better they would be classed as repairables.

Most of the tires received from the wholesale junk man are unsuitable for retreading although unfortunately far too many of them are retreaded or rebuilt. As a class they are unsuitable because of worn or rotten fabric. Blowouts are not important if the tire is sound otherwise.

Good tops are secured from both the tire manufacturer and the junk dealer but principally from the former. A good top is a tire which possesses a sound tread which shows little wear. The tire, however, probably has some defect in sidewalls or bead. Rimcut is a very common trouble. Blowouts close to the bead and therefore difficult to repair is another cause and defective beads still another.

More Parts Needed

(*Continued from page 10*)

Just two more instances. A certain city wished to purchase a motor truck and finally selected one at $6000, as offered by the New York representative of the concern. The only hitch was the matter of stock parts but the representative assured the city that there would be a complete set of all parts in New York city in 90 days and always thereafter. That was 5 years ago and to date there has never been a part kept in New York. Several times the city has had to lay up the machine waiting for parts from the West. Would that city buy another truck of that make? In our town, there is a garage that has sold an average of over a hundred cars a year at $1600 but the total value of the repair parts stocked does not run over $50—and that for a field of nearly a thousand cars, besides tourists! I have one of the cars myself, bought against my best judgment except that I have a Ford to fall back on, and my experience with the dealer is typical of the others: when I needed new spring bolts, I was told that I could either wait until they were ordering stuff or I could pay the messenger charge to see if they could get them out of stock in New York.

Ford Parts Easily Obtained

And that is why we always advise in this way when advice is asked for, "Get a Ford." From the nature of our work and our experience and by friends, that question often comes up as to what car is the best to buy. We know too well not to give advice unless it is asked for. Many times, though, the questioner laughs at the answer or holds up his hands in horror. But pressed for the reason, it takes but a few words to present the side that the dealer never mentions and as a clincher to name one or more of the "stung" for corroboration. Ford parts of one make or another may be purchased in every hamlet in the country, Ford stuff stands up, and we have a sneaking suspicion that the reason the other people who have threatened to get "Ford" have failed miserably is because Ford makes a business of keeping his cars going. As to all the others, they are so interested in juggling their securities and in selling new cars that their attitude toward customers and the attitude of the dealers is synonymous to that of the politicians before and after election. It is one thing to sell a man a car, but a vastly different proposition to insure this car running day after day. Service will keep it sold and parts service is one of the all important factors.

Keeping A Motor Bus Line Running

The City of Bridgeport, Conn., Has the Distinction of Being the First Trolleyless City and Affords Motor Truck Dealers a Chance to Study the Future of Keeping a Bus Line's Equipment Tuned Properly

JUST as the railroads have their maintenance divisions, so must a motor bus company have its service division. In other words, if such concerns are to succeed in business they must adopt methods that will insure permanency of organization. Buses in poor mechanical condition cannot succeed. Unclean buses, or ones with too low steps will soon prove unpopular. These are but a few of the things to be observed in connection with successfully operating a bus line.

Some lessons can be learned from the situation in Bridgeport, Conn., which city has the distinction of being the first trolleyless city. For several weeks this city has depended entirely upon motor buses for its passenger transportation in all parts of the city. Impossible as it first seems, Bridgeport's 350 buses have met the emergency in an admirable manner; have provided quicker transportation to all parts of the city previously served by the trolleys and some parts not heretofore served; have reduced vehicular congestion and are making money at a 5-cent fare.

Bus and Trolley Controversy

Eleven days ago all of the Bridgeport trolleys were withdrawn from service after a controversy in which the trolley company attempted by injunction to prevent motor buses from operating on all lines paralleling the street car tracks.

When the trolley service was discontinued, the motor buses were able to meet the emergency by reason of the previous establishment of routes paralleling the trolley lines; by proper regulation on the part of the Bridgeport Police Department and by the organization of the bus owners themselves. When the change from trolley service to bus service went into effect, there was very little confusion, and the public seems very well satisfied with the service and with the 5-cent fare charged on all of the city routes.

The test which the motor bus is undergoing in Bridgeport marks a distinct step forward in city passenger transportation. It is really the second step in the development of passenger transportation by buses in this country. The first step was the original jitney movement of several years ago which failed because of the use of second-hand truck equipment and converted passenger cars by more or less irresponsible individuals who knew little or nothing of business methods. Many of these original jitney operators failed because they knew nothing of the cost of doing business and imagined that they were making money until they were faced with their first vehicle overhaul. Others failed because they carried no insurance and had their earnings wiped out when they experienced their first accident resulting in injuries to persons or to other peoples' property.

The second step in the bus development now in progress in Bridgeport is analogous to the original jitney movement only in that the buses are in the great majority of cases owned by individuals. The most notable difference between the Bridgeport buses of today and the jitneys of several years ago is the better class of truck chassis employed and the introduction of buses carrying from twenty-five to thirty-five passengers. Practically none of the Bridgeport buses are second-hand trucks or converted passenger cars but are vehicles mounted on giant pneumatic tires for easy riding and provided with bus bodies designed for the work.

350 Bridgeport Buses

While Bridgeport's 350 buses are today carrying all of the city's 150,000 fares a day at a cost of 5 cents a ride, they do not mark the final step in bus development. Rather they point the way to a third or ultimate step in passenger transportation by motor bus which will not be subject to the disadvantages of the present day system. While there has been no complaint about the frequency of bus operation during the rush period in the morning and afternoon, the service late at night after the theatres and other places of amusement have discharged their crowds has not been satisfactory. This has been due to the disinclination of the individual owners to operate their buses when the number of passengers to be carried could not possibly equal the cost of bus operation.

The seats of the great majority of the Bridgeport buses are poor and dirty and are not conducive to satisfaction on the part of well dressed women. The bus steps are high and make it difficult for elderly persons to mount or leave the buses. Then again there is too much crowding; people are allowed to stand

(Continued on Page 54.)

Doing One Thing Well

Here is a man who through consistent hard work, arising early and retiring late, is able to make a good living by doing just one thing well—putting monograms on cars at 50 cents per. He is Charles W. Ramsey and with his family has traveled from Maine to California and from Canada to the Gulf, rendering a class of service a little out of the ordinary. He has monogramed over twenty thousand cars and has been able to perform a rush job in six minutes. He is always on the job with a "Good morning, sir, I'll put your monogram on your car while you wait, or have it done when you get back." Truly the automotive industry gives employment to some strange types, doesn't it? The reproduction herewith is from a postal card sent by Mr. Ramsey and shows a sample of his work. Ordinarily the letters are painted in gold with a black outline.

EDITORIAL

SOME GOOD SERVICE ASSOCIATIONS CAN DO

FOR a good many years, the automobile industry has been chiefly concerned with the manufacturing and selling of automobiles and it is not until very recently that the third branch of the industry has had any very considerable amount of attention from car manufacturer and dealer alike.

The first problem confronting the pioneers in the automobile industry was one of manufacturing. The vehicles at first were imperfect and it was really not until the last year in the nineteenth century that the cars were anything more than a joke to a large part of the population. The next ten years saw the start of a real industry and agents and salesmen began to appear for different makes of cars in the larger cities. With the beginning of sales to the public began the problem of service. The public knew nothing about the vehicles, or their operation and the jokesmiths of the day earned much money writing about "get out and get under" jokes.

The dissatisfied customer always has been the greatest thing with which the sales organization has had to contend and it has been left to the service man to give the purchaser that satisfaction which he is entitled to and which will go so far in influencing other purchasers to buy cars. More and more it is being appreciated that the continued prosperity of the industry is dependent upon the degree of satisfaction that is accorded to the user and it is on this account that especially keen interest is being taken in the subject of service at this time.

Great national organizations such as the National Automobile Chamber of Commerce and the National Automobile Dealers Association have given thought to the importance of the service end of the industry and have viewed with much satisfaction the efforts that the service men and dealers have made in some cities to bring service on the high plane that it should be on.

All attempts to get together to work out means for the betterment of the service vocation, making it an agreeable line of work, of greater esteem in the eyes of the public and, in short, raising the plane of service from its old levels to standards that will place it on a par with any other honorable occupation have been given the heartiest cooperation by these bodies.

When men of a profession see that there is need for improvement, usually the first thing to do is to have some kind of an organization so that troubles can be talked about and remedies suggested. Doctors, lawyers and engineers have such bodies and in our own industry, the manufacturers and the sellers have organizations, both national and local, so what could be more natural than for the service men to think that the same good could be accomplished with service associations?

There has been a great deal of discussion as to the question of whether there should be a national service association just as there is a national dealers association and the Society of Automotive Engineers which is national with local sections in cities having a large automotive interest. To this question we will say no and we shall tell you why we say it. The service interest insofar as the local service man is concerned is strictly a local problem. The problems that the local service man has to meet are labor, competition in price and in quality of work and keeping the owner satisfied. What will interest the service man in Omaha may not interest the service man in Syracuse at all because the conditions and hours of labor may be different and he may have to meet an entirely different class of car owners. On the other hand, when Percy Chamberlain out in Denver has a perfectly splendid idea about flat rates, every service man in the country is interested, but this information can be disseminated through the channels of the automobile business paper and the agencies of the National Automobile Dealers Association and there would seem to be no place for a National Association to fit in.

We do not believe it really makes very much difference whether a service organization is a part of the dealer organization or is a separate unit by itself as long as they work well together and raise the plane of service from its old level to standards as high as those of any legitimate business.

RECLAIMING USED LUBRICATING OIL

JUST as there is great need for conservation of fuel oil, so is there equally as imperative need for conservation of lubricating oil. By this we do not mean saving through penny-wise methods of picking up the spilled drops here and there for in the aggregate, the total savings effected through preventing the oil from dripping when pouring it in the engine, and transferring it from receptacle to receptacle would not be sufficient to produce any great excess. The kind of saving that is essential is the re-using of the lubricating oil instead of throwing it away when it is drained from the crankcase.

During the war our government instituted certain processes whereby the oil used for the lubrication of the aviation engines was reclaimed after having once been used. The application was so successful that eighty per cent of all the oil used was reclaimed and used over. One of the surprising things about lubrication oil reclamation is that the oil after being reclaimed is actually a better oil than it was before being used. Some may question this statement but we still maintain that it is so. The reason is simple. Oil is one of the most stable compounds known. It resists all effort to break it up. A very small percentage will burn away while used in the engine but this is the volatile portion only. The dirt and black color that is apparent in any oil after use is not due to the oil but due to the road dust and the carbon that is collected from the cylinder wall. The gasoline that is swept down past the pistons is the one big factor that we have to contend with to-day and this is the chief reason that the oil need ever be drained.

Practically every service station in the country drains the oil from a few cars every day. The oil is now thrown away or is mixed with graphite to be used as a spring lubricant, which is a most wasteful method. It would be a money making investment for any dealer handling enough oil business to install an oil reclaimer and make a practice of reclaiming all oil drained from the crankcases. It is proven commercially possible to reclaim crankcase oil for ten cents a gallon. By allowing the car owner a reasonable amount for the oil he turns in and charging him for the reclaimed oil he buys, a nice profit will result. Further than this, a vast saving in the amount of oil used will be affected which will materially help the shortage problem when it becomes more acute than it is now.

Banker Impressed By Truck Tour

Caravan Crossing Northeastern Colorado Causes Change in Viewpoint—Farmers Being Shown What Can Be Done in Way of Livestock Transportation—Novel Features

DENVER, COLO., Aug. 20—Benefits accruing to the farmer through making wider use of the motor truck for livestock transportation are being shown in a three week, thousand mile farm development tour now being conducted through thirteen counties of Northeastern Colorado by the Rocky Mountain Auto Trades association. This idea of motor truck use is expected to open up a vast and paying field in the tour district as well as in a large part of the Rocky Mountain region.

And, incidentally, one of the largest bankers in the rich territory covered by the tour thus far has said publicly that the truck train has convinced him that he has been prejudiced in his viewpoint inhaving discriminated against the motor truck. Completely reversing the stand he previously took, he has declared himself ready and eager to give all the help possible to farmers wishing trucks for more efficient and more profitable farming. He has told the truck leaders that he believed a powerful impression could be made in favor of motorizing the farm if the same message that this truck tour had brought to him could be carried to all the bankers in the state.

Furthermore, the manager of one of the largest grain elevators in Northeastern Colorado, during a speech at one of the banquets incident to the tour, declared the motor truck to be absolutely essential to community growth on a broad scale and urged bankers and all business men to promote the using of trucks on the farm as a means of building up their own business returns.

Idea Undeveloped

So far, livestock transportation by truck is practically untouched and the leaders of the tour are seeking to impress its possibilities upon the average farmer and the business man in this territory. If the smaller communities will recognize the necessity of local packing houses, it is pointed out, and the farms are extensively motorized, farmers as far as a radius of one hundred miles can make substantial gains by bringing their animals to town in small shipments whenever a few animals are ready for market instead of waiting until a whole carload is properly fattened.

WHAT A MOTOR TRUCK FARM DEVELOPMENT TOUR IS DOING

It is showing the farmer new uses to which the motor truck can be put.

It is arousing public interest.

It is convincing the banker that his previous viewpoint is wrong.

It is teaching the distributors lessons in co-operation.

It is showing them better what their respective units will do.

It is stimulating interest among sub-dealers.

If ten hogs are ready to sell, for example, extra feeding expense can be avoided by shipping them by motor truck to a nearby market immediately. Beside, this plan would greatly lessen the loss by disease which is a heavy risk when animals are ready for market. It is urged that this program would obtain for the farmer as good a price for his stock, enable the diversified farmer to turn his assets into cash at more frequent intervals and at the same time make possible a worth while cut in freight costs. It is also claimed that the towns themselves would profit from this local packing house and farm motorizing plan.

Distributors Profiting

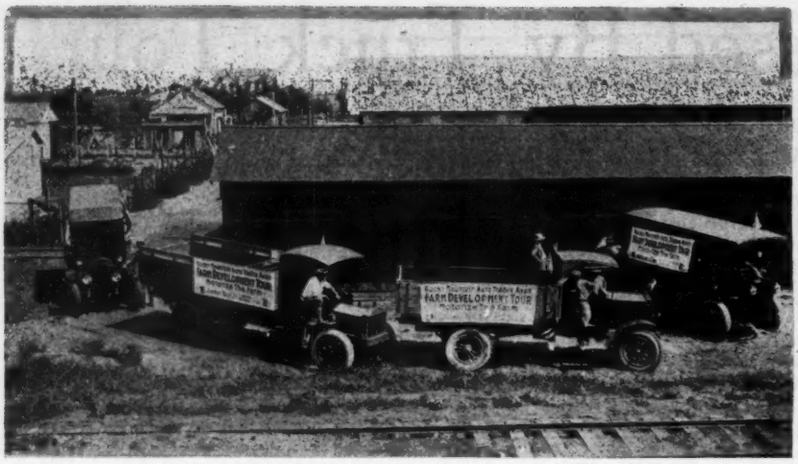
Valuable lessons in co-operation are being learned by the men taking part in the tour and a substantial growth in concerted effort to develop the use of trucks in general is being predicted. These men are also learning more about what their own respective units can do and are gaining stronger faith in what they are selling. One big reason for the outburst of enthusiasm on the part of the truck distributors, who are already talking of a similar tour through another section of the state sometime this Fall, is the remarkable stimulation of interest among sub-dealers in the counties thus far traversed and among passenger car dealers eager to add trucks to their selling lines.

While the dealers have made absolutely no effort to sell any trucks, sales have been made thus far as a direct result of the tour. Passenger car prospects also have been developed.

There are sixteen demonstration trucks and four service cars and trucks in line. The trucks, all of which have been entered by Denver distributors, range from ¾ tons to 3 tons capacity and are equipped with bodies suitable for use in diversified farming and with pneumatic tires. Two passenger cars are being used as an advance car and an official car for the tour commander, S. E. Norton. In the latter car a first aid kit is carried.

An extra truck carries a band of twenty-five boys and one accordionist who plays from truck to truck to at-

Sixteen demonstration trucks and four service cars and trucks are taking part in the tour that is showing the farmers of Northeastern Colorado all the uses to which a motor truck can be put. So successful has been the enterprise thus far that distributors are talking of sending out another caravan this Fall to cover other parts of the state



One favorite form of demonstration is to go into a field where threshing is in progress, haul the grain from the shock to the machine, then haul the loose wheat from the separator to a grain elevator in town and bring back farm machinery, lumber, fencing wire, coal, groceries, or any other supplies wished. Right—A farmer living near Brush, Colo., wagered that a truck hauling 6100 lbs. of coal to a ranch eleven miles away could not travel this road. A long stretch of the road was made up of deep sand and steep grades combined; then came sandhills formed of blowing, drifting sand of the bottomless variety with grades as steep as 11 per cent in places. The farmer lost. The truck make the first six miles in 20 minutes; it completed the round trip and unloaded the coal in three hours

tract groups of people to every demonstrator truck individually. Special entertainment features are provided also by four marines sent out by the United States Recruiting Service. The truck carrying them is equipped with machine guns, mortars and aerial bombs, the bombs being fired to announce the approach of the truck train to towns along the line. An airplane accompanies the caravan to bomb the towns with handbills announcing the demonstrations and free entertainments and to make passenger flights while the trucks are being demonstrated.

Speeches are made by Mr. Norton, and Harrison Goldsmith, secretary and business manager of the trades body with technical talks by E. S. Foljambe of Los Angeles, farm development tour technical expert aiding the enterprise. Three other Los Angeles farm development tour specialists helping the success of the Colorado event are Gilbert McNeil, who assisted the trades association in organizing the tour; A. F. Osterloh, Jr., who made advance arrangements three weeks before the tour started; and Gilbert Brown, publicity man.

Moving pictures are among the entertainment features where night stops are made. They show trucks doing various kinds of farm work and include many scenes connected with the National Sales Managers & Farm Development tour. Electric power is furnished by a special unit which also supplies current for lighting the truck train, pumping water for shower baths and giving other kinds of service. Stops of 1 hour to 35 hours for demonstrations and entertainment programs will be made in a scheduled list of towns.

Special rules of the road are observed including the speading out of the trucks about 1000 feet apart and keeping on the extreme right hand side of the road regardless of road conditions. The trucks maintain their position by number all through the tour and go entirely by number instead of by name. Bugle calls are used for travel orders.

ATTENTION, FARMERS!
We are trying to an advanced age
Pneumatic-Tired Trucks on the Farm
INCREASE FOOD PRODUCTION
DECREASE FARM LABOR
INCREASE PROFITS
The Rocky Mountain Auto Trades
Farm Development Tour
Will prove it to you on your own farm
COME AND SEE
Big Demonstration on Farms in Your Neighborhood
Moving Pictures of Trucks on the Farm
Listen to the Speakers
Hear the Band
Big Entertainment
ALL FREE!!
This is NOT a Selling Campaign, but one of Education

An airplane bombs the towns where demonstrations or entertainments are to be held with this and other handbills. And when it hasn't anything else to do it comes back and takes passengers up for flights

The demonstration orders are made out on a combination form and are dated and signed by the tour commander. The driver fills in the make of truck, capacity, kind of body and load, length of haul in miles, time of start and finish of trip, weight of load, kind of road and distance traveled through field. A large register is carried for the names of persons witnessing the demonstrations and all information possible to obtain of a practical nature is gathered up and supplied to all the dealers alike.

A postcard addressed to the association and containing a list of the trucks in the tour is handed to everyone interested for convenient use in requesting literature or other information regarding any make of truck represented in the tour. This card also carries some brief educational arguments in favor of using trucks on the farm.

The counties benefiting directly from the farm development tour have 20,525 farms averaging 332 acres and comprise a total territory of 23,704 square miles with a population of 182,200. There is a total of more than 12,500 miles of highways most of which are suitable for motor travel. The territory has both irrigation and dry farming districts, with a great deal of dairy and livestock industry added to a special crop and diversified farming, thus providing as wide a field as could be desired for demonstrating the general utility service of trucks on the farm.

The attendance in many of the towns visited has been equal almost to the entire population. Town and county officials, commercial clubs and other organizations are co-operating toward the success of the tour. Because some of the smaller towns could not be expected to provide accommodations for the hundred men and boys in the touring party the caravan carries tents and bedding.

TRUCKS SUPERIOR TO WATERWAYS

New Orleans, La., Aug. 20.—One of the most interesting facts brought out at the recent meeting of inland-waterways and water-transportation experts at New Orleans was the admission that the waterway freight system cannot compete successfully with any well-operated motor truck system. It was admitted by several delegates that the much talked of inland waterway systems, wherever paralleled by good roads, over which motor trucks and trailers are operated, soon go out of business, except for long hauls. The concensus was that the motor truck can be operated much more economically, run much faster and kept on better schedule than the steamboat.

Six Cities to Be Reached by Organization of Trunk Lines

Terminal Station Will Be Established With Routes From It Covered Daily

KANSAS CITY, MO., Aug. 20—An extensive organization of motor truck lines is under way in five Kansas cities and on western Missouri city under the direction of the transportation department of the Cravens Motor Co. here. The analysis of the field and a survey of traffic conditions in preparation for the establishment of lines is being carried on at Hutchinson, Salina, Topeka, Leavenworth and Kansas City, Kan., and Joplin, Mo. The financing of several of the lines is practically complete and they will be put into operation in the next thirty days.

The Cravens company has employed experts to analyze each field of suburban transportation. Road conditions, the strength of bridges, amount of rainfall, distances and operating influences in each district are being examined. A survey of the traffic problems of the shipper is being made, his bills of lading gone over, the average amount of his tonnage computed and routes arranged on scientific lines with reasonable tariffs.

The plans outlined for operation consist in the establishment of a terminal station from which two trucks would cover each route of not more than a hundred miles, round trip, each day. Refrigerator trailers will carry packing house products and perishable foodstuffs.

The transportation department which is laying out and arranging the lines is under the supervision of H. E. Rose, vice-president and general manager of the Cravens company. L. D. Knowles, formerly connected with the Missouri Pacific railroad as assistant freight agent here, is in charge of the tariffs, schedules and surveys. Associated with Mr. Knowles is C. H. Wolf, formerly manager of two large interurban express companies running out of Chicago.

Implement Association to Hear Bankers at Convention

Chicago, Aug. 20—Plans are being perfected by the National Implement & Vehicle association with headquarters in this city for the twenty-seventh annual convention to be held at the Hotel Traymore, Atlantic City, Oct. 20-22. Among the speakers will be J. R. Howard, president of the American Farm Bureau association, and George W. Collins, president of the National Federation of Implement & Vehicle Dealers associations. There will also be present a representative of the American Bankers association who will speak on finances. Questions on transportation and labor will be discussed by men prominent in both lines. At the banquet which will conclude the convention the principal speech will be made by John Fletcher, vice-president of the Fort Dearborn National Bank of Chicago.

Speed Tests Within Borders of California to Be Stopped

Sacramento, Calif., Aug. 21—No more speed trials will be permitted in California. The arrest of Erwin W. "Cannonball" Baker by Charles J. Chenu, superintendent of the Motor Vehicle Department, is the beginning, Chenu says, to enforce the speed laws against the professional drivers as well as against the automobile dealer.

Baker drove a Templar car across the continent in less than seven days. Rounding a dangerous curve in the San Bernardino mountains, he ran into a speed trap prepared by Chenu, and was arrested, charged with violating the state motor vehicle law.

Hard upon Baker's arrest came the news of a run of the Essex from coast to coast in four days and fourteen hours. Harry Arnold, local Essex dealer, one of the best known road racers in California, piloted the car from San Francisco to Gardnerville, Nev., and awaited the return car there, bringing it back to San Francisco. The news leaked out that further trials are to be made, and Chenu has speed traps laid for Arnold all along the road.

Chenu issued this statement regarding the matter:

"There is to be no violation of the California Motor Vehicle Act. As long as that law says the speed limit is 35 miles an hour, and that only where the road is straight and unobstructed, as far as I and my inspectors can do it, we will see there is no car making faster time."

Inventor of Locking Device Sues to Have It Manufactured

Indianapolis, Ind., Aug. 23.—Suit to compel the specific performance of the terms of an alleged agreement to manufacture and sell an automobile locking device known as "Lek-tro-lok" has been filed in the local Federal Court by William H. Damsel of Franklin county, Ohio, against the Hugro Manufacturing Co. of Warsaw, Ind.

The complaint states that Mr. Damsel sold the locking device, which was his invention, to the Hugro company on an agreement that the defendant was to put it on the market not later than May 1, 1920, and pay him a royalty of 60 cents on each device embodying a lock on both electrical and gasoline parts of an automobile; ten cents on each lock made to protect electrical parts only, and ten cents on each lock designed for Ford cars. He says he received an initial payment of $5000 on the terms of the contract, but that the defendant has failed and refused to take steps to obtain a patent and has not manufactured the locks.

Electric Railways Alarmed by Good Service of Motor Buses

Federal Commission Submits Report to President That Serious Competition Has Developed

WASHINGTON, Aug. 23.—Sweeping measures to curb the operation of motor vehicles and thereby help electric lines which are facing bankruptcy because of the more satisfactory service given by motor buses, are recommended in the report of the Federal Electric Railways Commission submitted to President Wilson to-day. The commission proposes that because the great increase in the use of motor vehicles "has introduced a serious, although not a fatal, competition to the electric railways, they should be subject to regulatory provisions as public carriers."

Exception is taken by the commission, headed by Charles E. Elmquist, president and general solicitor of the National Association of Railway and Utilities Commissioners, to "the untrammelled freedom from taxation, maintenance of highways and financial responsibility for accidents" which the motor operators enjoy. The electric carriers protest against the discriminatory practices of the buses which have taken much of a profitable short haul traffic in certain cities.

After careful investigation and long deliberation the commission reached the conclusion that while private automobiles undoubtedly have cut into the profits of street railways, "it is not deemed consonant with the theory of American institutions and government that the free movement of private citizens by their own means of locomotion should be restricted in order to compel them to make use of public vehicles, whether the latter be operated by private agencies or directly by the government." It believes all that can be properly done in this direction is to compel private vehicles using public highways to pay taxes proportionate to the burdens they place upon the highways as compared with the burdens placed upon the highways by the street cars.

NEW PLANT FOR PREST-O-LITE

Boston, Aug. 21.—Cambridge, Mass., is soon to have the next to the largest acetylene gas manufacturing plant in the world. The Prest-O-Lite Co. has bought eight acres of land on Concord avenue opposite Fresh pond and has started excavations for twelve one-story steel and concrete buildings, which are expected to be ready for occupancy the first of next year.

ANOTHER LOCK FOR SIMPLEX CORP.

Chicago, Aug. 20.—The Simplex Corp., Chicago, makers of the Simplex Steering Wheel Lock for the Ford, Dodge, Overland "4" and Chevrolet "490" have taken over the Theftproof Auto Lock formerly manufactured by the Hershey Manufacturing Co., Denver.

No Special Carload Rates Allowed for Tire Shipments

Applications in Connection With Express Companies Increase Denied by Interstate Commerce

WASHINGTON, Aug. 20—Applications of manufacturers of rubber tires and inner tubes for special carload rates on all shipments were denied by the Interstate Commerce Commission in its decision permitting express companies to increase the present rates by 12.5 per cent. The Commission claimed that no adequate ground to support the request for an exception for tires and tubings had been disclosed by the shippers.

Rubber manufacturers wanted the Commission to establish carload commodity rates, to apply only when the articles are loaded and unloaded by the shippers, "enough lower that the less-than-carload or any-quantity rates to compensate for the absence of a pick-up and delivery service in such cases." The Commission found that "coupled with a showing of the volume of inbound shipments of fabric and outbound shipments of tires and tubes, principally by express because of pressing demands, the opinion is expressed that with the restoration of normal freight service the carload express business will substantially decline."

According to the Commission "this opinion is an echo of the generally voiced criticism" that express companies have permitted service to be broken down by acceptance of volumes of traffic that should move by freight. The award of the Commission does not take into consideration the wage increase recently handed down by the Federal Labor Board.

NEW MARMON COMING THROUGH

Indianapolis, Aug. 20—The new Marmon 34 speedster which was described in the Aug. 12 issue of MOTOR AGE and which is the first two-passenger car built by Nordyke & Marmon Co. for several years, is now coming through production as the mechanical men of the plant state the case. The car is low hung and while it has all the distinctive characteristics of the 34 the low build of the body gives it a greyhound slimness and an attractive appearance of agility.

LAW IN SOUTH TO CURB THEFTS

New Orleans, La., Aug. 21—A law which provides for the registration of automobiles, much after the manner of the registration of real estate, and calculated to put a curb on the steadily increasing number of automobile thefts, has been passed by the Louisiana State Legislature, and becomes effective Sept. 1.

The new law provides that all sales or transfers of automobiles shall be evidenced by an authentic act recorded in the parish in which the sale is made; that every act of sale or transfer of an automobile shall state the year of manufacture of the car, the price thereof, the style and model, the number, size, make and power of the engine, and the name and address of the person from whom the seller acquired the car, as well as the place and time of record of the seller's title.

Church Attendance Trebled by Sermon From Automobile

Kansas City, Aug. 23—Using the tonneau of a passenger car as his pulpit Dr. Chas. E. Draper, pastor of the Slavens Memorial Methodist Church of this city, delivered the first automotive sermon heard here on the text, "Spiritual Gas." In the church yard surround by scores of cars Dr. Draper inaugurated his church-on-wheels thereby trebling the church attendance.

During the summer months the attendance has dwindled while motor cars speed by in increasing numbers. Dr. Draper came to the conclusion that he would not wait for the people to come to the church but would take the church to the people. The success of the venture will result in a series of motor car sermons in various parts of the city.

In his theme "Spiritual Gas" the minister drew a line between the power of the mechanical motor and the church. Every church must have four speeds ahead but no reverse and in the past the membership has been running in low gear, he said.

Compiling List of Owners Who Are Entitled to Tire Discounts

Co-Operative Business Policy Suggested to Stabilize and Improve Conditions in Industry

LOS ANGELES, Aug. 20—To stabilize conditions in the tire industry, dealers, jobbers and manufacturers are compiling a list of owners of five automobiles or more who will be entitled to discounts.

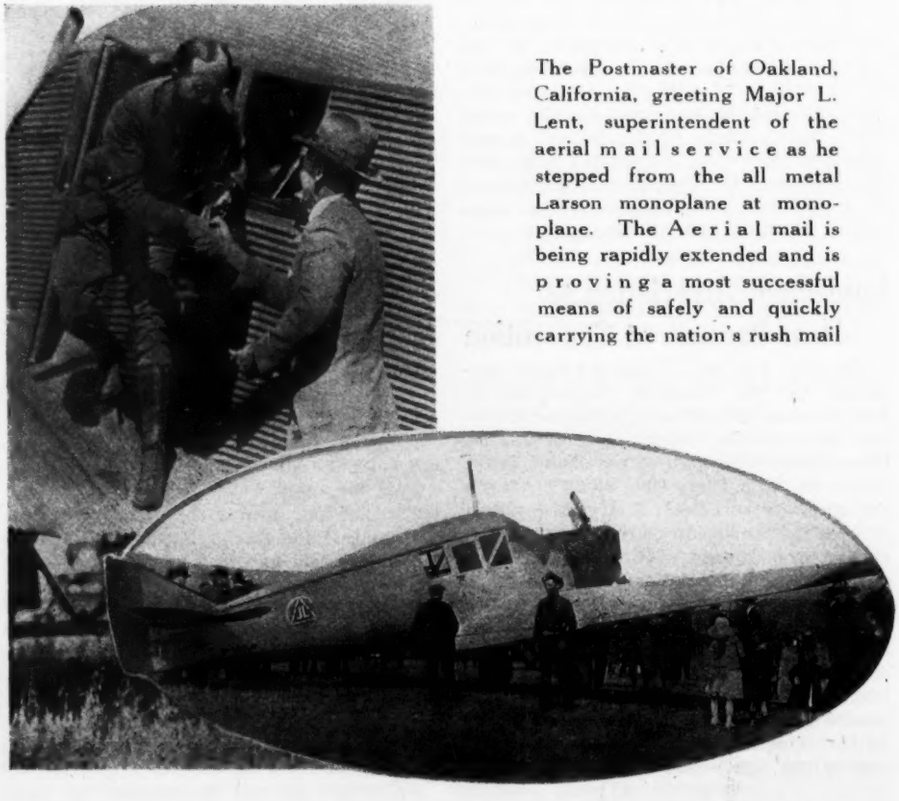
Those not included in this list will be asked to pay the manufacturers' list price for their goods. This action is necessitated by the ever-increasing cost of doing business and the desire of every tire buyer to insist upon discounts.

At a meeting of the tire dealers, manufacturers and jobbers of Southern California, they discussed the precarious condition of the industry and a co-operative business policy was suggested to improve conditions.

At the present time dealers are receiving a discount of 21 to 25 per cent on their goods and it is said that business overhead eats up nearly all of this. This percentage of commission has not been raised in the past four years, in fact, about five years ago tire dealers were receiving in some cases as high as 45 per cent on their sales.

Recently an association of tire jobbers and manufacturers was formed to cope with conditions and to co-operate with the dealer.

California Mail Arrives By Plane



The Postmaster of Oakland, California, greeting Major L. Lent, superintendent of the aerial mail service as he stepped from the all metal Larson monoplane at monoplane. The Aerial mail is being rapidly extended and is proving a most successful means of safely and quickly carrying the nation's rush mail

Industrial Survey Shows Need of Trained Mechanics

One Illinois Firm Is Equipping a Room in Its Establishment to Be Used as School

BLOOMINGTON, ILL., Aug. 20—That an acute demand exists for trained motor vehicle mechanics is indicated by a recent industrial survey of this city dealing with the industry. There are probably 500 men employed in the various garages of Bloomington. These men are divided into three classes: Skilled, 212; semi-skilled, 182; unskilled, 100.

The skilled men do the highest grade of repair work upon all kinds of motor vehicles. There are a few highly skilled men in the automobile electrical department. The division is sharply drawn between the auto-mechanic and the auto-electrical workers. Only a few of the garages do both lines of work.

The unskilled class is made up largely of young men who have taken up the trade but who have not been engaged long enough to gain the skill, knowledge and training sufficient to take care of all kinds of mechanical adjustments upon the numerous variety of cars now on the market.

A general complaint is heard from the Bloomington dealers concerning the scarcity of all around auto-mechanics. One of the chief troubles reported by the proprietors of the Bloomington repair shops is the very heavy expense caused by labor turnover. Auto-mechanics are so scarce and bids for machinists are so great that the labor situation is becoming a greater problem each year.

The suggestion of a school to train auto-mechanics appeals to every repair shop owner here. One firm in Rockford is now equipping a room in its establishment which is to be utilized for a school in this field and it will employ an instructor during certain evenings of the week. This establishment believes that it is cheaper to operate such a school and develop mechanics in this manner than to bring men in from out of town. It is maintained by this firm that men trained at home will remain longer than the floating population and be more valuable in the long run.

If the dealers in cars and proprietors of all repair shops in each city get together and arrange a series of lectures and demonstrations a vast amount of important instruction could be disseminated, young men attracted to the industry and the standard of efficiency vastly increased.

Two Young Men Find Good Service Brings Its Reward

Burlington, Ia., Aug. 20—Five years ago, two young men came to this city and opened a small garage. By hard work and close attention to the wants of their customers they built up a clientele that has resulted in the formation of the Warming Motor Co. of this city with C. H. Warming as secretary-treasurer and A. P. Warming as president.

The new company is building a modern garage and sales room, three stories in height and basement and fireproof throughout. The company has the distribution for this territory of the Nash, the Haynes, Cole 8 and Hupmobile in passenger cars and in trucks they represent the Republic, the Nash and the White. A retail and wholesale business in passenger cars, trucks and accessories will be carried on all over this territory. The success of the Warming boys goes to show that opportunity to make a success is not lacking, where there is a will to work and give real service to your trade.

Why Dealers Can Make Summer Sales of Tractors

In central Illinois it has been the custom for most of the farmers to plow for wheat late in the Fall and tractor dealers have not been figuring upon big business until the Fall months.

One of the progressive farmers of the section has shown the dealers that they need no longer experience a busy Spring and Fall, a dull Summer and Winter.

Lawrence Funk started in to plow early a year ago.

He plowed 60 acres in July and August, as soon as threshing was over.

And he left 20 acres to be plowed two months later.

This summer he compared the yield and this is what he found:

The tract plowed early produced 52 bushels to the acre; the late plowed yielded 30 bushels.

The difference was so great that he decided to plow every acre as early as possible this year, massing all his tractors and completing the job in the minimum of time. The dealers in power farming machinery have procured all the data possible on this performance and owing to the prominence of the farmer his methods of early plowing will be generally followed, it is believed, in central Illinois.

AGENCY CHANGES HANDS

Fort Wayne, Indiana, Aug. 20—By the terms of a deal just concluded with the Colfax company, a prominent South Bend firm of automobile dealers, the Ideal Auto Manufacturing & Sales Co., of this city, has disposed of its entire agency business and in the future will deal only in automobile supplies and service station contracts. The Ideal Auto company has been in business for the last five years under the management of Matt Jones and has dealt in Haynes and Oakland cars.

National Chamber Sees Boom in Demand for Replacements

Peak of Car Production Reached for Present With Sales Prospects Looking Good

WASHINGTON, Aug. 20—In a review of business conditions for July the committee on statistics and standards of the United States Chamber of Commerce points out that "any complete point of saturation in automobiles does not seem imminent—rather, in a moderate way, a readjustment which has long been looked for." It is the opinion of these officials that the industry gives indication of approaching the peak of production for the present. They believe that business will boom for sales agencies and garages.

According to the Chamber of Commerce "not only will there be a demand for replacement but also for new purchasers, for we are fast realizing that automobiles are a necessary and inalienable factor in modern civilization. Any talk of their being luxuries and unessentials is rather unknowing and foolish. There was once the same talk about telephones and telegraph. Outside the definite part which automobiles play in business and which steadily grows in importance, they have done more to broaden the understanding and mental horizon of their users than any invention within a generation.

"In especial they have been a boon, beyond comparison, to the dweller on the countryside—on the farm and in the small town."

Telephone Firms Large Users of Trucks and Passenger Cars

New York, Aug. 21—Statistics gathered by the National Automobile Chamber of Commerce show that not only are telephone companies large users of trucks but of passenger cars as well. The New York Telephone Co. is the largest user of cars and commercial vehicles. Its fleet numbers 935, of which 637 are runabouts and 68 are ¾-ton trucks. The Bell Telephone Company of Pennsylvania is the second largest user of passenger cars, having 514. Other large users of passenger automobiles among the telephone companies are:

Pacific Telephone & Telegraph Co., 204; Chicago Telephone Co., 170; Southern New England Telephone Co., 157; Iowa Telephone Co., 120; Southwestern Bell Telephone Co. of Missouri, 96; Wisconsin Telephone Co., 89; Nebraska Telephone Co., 51.

WINTER SHOW FOR PHILADELPHIA

Philadelphia, Aug. 20—It is the present intention of the Philadelphia Automobile Trade association to arrange to give the winter automobile show as soon as possible after the New York show but no date has been fixed and will not be until after the directors have met the second Monday in September.

400,000 Lbs. of Freight Moved By Ship-By-Truck Terminal

Business Interests in Kansas City Co-operate in Plan Started June 1 to Reach Suburbs

KANSAS CITY, MO., Aug. 21—The ship-by-truck terminal established June 1 is meeting with successful co-operation on the part of the business interests and operators of trucks to and from Kansas City. Since its establishment the terminal has handled over 400,000 pounds of freight for suburban points. Iron products, foodstuffs, furniture, machinery, hardware and dry goods are shipped daily over the eleven lines reaching from here to the small suburban centers and farming communities within a seventy-five miles radius of the terminal. It is the last established of the six truck terminals in the country.

With extensive advertising through pamphlets, form letters, circulars and time tables the Suburban Motor Transfer Co., managing the station, has enlisted the business of Kansas City's most extensive suburban shippers. The terminal is located in the center of the wholesale and jobbing house district at Ninth and Hickory streets. City shippers deliver their freight to the station where it is held until a scheduled or special truck calls for it and makes delivery to the door of the country merchant to whom it is consigned, thus saving time and money, insuring delivery, satisfying the retailer and eliminating breakage, shrinkage, lost goods, claims and complaints. Special trucks are provided for livestock so that the stockman may get his cattle and hogs on the morning market a few hours after leaving his ranch. The trucks are of 1½-ton, 2, 3⅛, and 5-ton capacity and carry a full load on trips from the city returning with milk for Kansas City's seven largest creameries.

The transfer company managing the station charges truckers operating out of the station 20 per cent of the amount of their freight bill for the privilege of using the station. The minimum charge to the shipper for any shipment is fifty cents. The freight rates are computed from the class of merchandise, the distance from the point of origin and the road conditions. Previous to the establishment of the station suburban truckers called for shipments from shippers which consumed several hours picking up freight in the city while under the present plan the shipper routes his goods "via Ship-By-Truck Terminal," which is responsible for their security and insures the truckmen against loss of time consumed in loading.

"The entire problem of suburban transportation depends upon good roads," said W. T. Bancroft, general manager of the terminal. "No truck lines are established here which will not be able to operate every day in the year. There are many profitable lines to be established between this city and suburban points which await improvement of roads. The Kansas City ship-by-truck terminal takes as its slogan 'Anything, Anywhere, Anytime,' and is living up to its ideal."

One Way of Improving Selling Force

Are you a dealer or a repairshop owner who is feeling the effects of having men in your employ who are not properly trained?

If so, why not adopt some plan whereby each man can be given a systematic course of training.

Frank D. McElroy of Rockford, Ill., has given the subject considerable attention.

This is what he proposes:

The dealers in each large city co-operating if possible with the repairshop men should arrange a series of evening classes to include:

1—A course of ten lectures for salesmen led by one of the most successful salesmen.

2—A class for automobile repairmen now employed.

3—A class for battery and electrical workers.

4—A class for drivers in extending first aid to cars in trouble.

Blow-Out Proof Tire Will Soon Be Placed on Market

Boston, Aug. 20—The Complex pneumatic tire invented by William H. Emeno of Chelsea is soon to be put on the Boston market. In appearance the tire looks no different from the ordinary pneumatic one used on passenger cars and trucks, but its advantage, as claimed by its inventor, is that it will do away with the carrying of extra shoes due to the fact that it will be impossible to blow out a shoe of the Complex type.

Construction of the tire involves a specially made shoe, the interior of which contains small cups on either side wall and that part which is on the inner side of the tread. Into these cups are fitted small para rubber balls about two inches in diameter, these extending in series all around the shoe. A specially constructed inner tube, made extra heavy on the tread side and having slight indentations to fit over the rubber balls, is then inserted with the regular breaker strip placed over the tube.

When inflated the tube pressure is against the balls and the rim instead of the tread of the shoe and the rim, as in ordinary tires. The new tire is now undergoing a severe road test, the inventor using new and old shoes of the ordinary type to better perfect his invention and give it a thorough trying out before placing it on the market.

Gas Shortage Less Acute but Oil Companies Jump Prices

Coast Dealers So Glad to Obtain Fuel They Ask Further Investigation Be Halted

PORTLAND, ORE., Aug. 23—The gasoline shortage hereabouts that for nearly three months has kept motorists on rations is slowly on the mend. The eastern part of the state now has no shortage, and conditions are steadily improving in western Oregon and Washington. There is still a shortage, but it is much less acute.

It is quite a coincidence that relief from the shortage dates from a rise in the price of gasoline here to 29 cents per gallon, with one company, the Shell, charging 30 cents. Both prices include the state gasoline road tax of one cent per gallon, but the new price is an outright jump of 3½ cents per gallon at one time over prices that prevailed when the shortage began.

The oil companies claim the higher price is made necessary by increased freight costs of importing gasoline from the Mid-continent field to the coast.

However, Oregon dealers and motorists are only too glad by this time to get gasoline at any price. They are so glad, in fact, that this week a delegation from the Dealers' Motor Car association of Oregon went to Salem, headed by M. O. Wilkins, president, to urge State Treasurer Hoff not to proceed with an announced investigation of the new gasoline prices.

The dealers very frankly told Mr. Hoff that they hoped he would leave well enough alone and indefinitely postpone the investigation. They indicated that if he went ahead with it, they feared retaliatory measures by the oil companies and continuance of the shortage. Mr. Hoff has taken the investigation under advisement.

HOLD COUNTY TRACTOR SURVEY

Lafayette, Ind., Aug. 23—A comprehensive tractor and farm survey is being conducted in Tippecanoe county under the direction and farm management of Purdue University and Walter V. Kell, county agent. The cost of horse and tractor labor will be compared and the effect on crop yield and farm organization by the tractor will be determined. According to available data there are at present 187 tractors in use in this county.

MILTON NOT IN DUESENBERG

In the report of the triangular race meet at the Columbus Driving park on Aug. 1 it was stated that Tommy Milton, one of the three contestants, drove a Duesenberg. In a letter to MOTOR AGE, Fred S. Duesenberg of Duesenberg Bros. Elizabeth, N. J., corrects this, stating that no Duesenberg car was driven in the race.

Bankers Have Not Been Sold on Vital Necessity of Motor Trucks

Charge Denied That Because of Their Railroad Holdings They Are Against the Industry

NEW YORK, Aug. 21—Almost everybody agrees that the motor truck industry is most essential. There is a unanimous agreement among Federal Reserve bankers, who have arbitrarily classed passenger cars as luxuries, that banks should lend every assistance possible to motor trucks at a time when the shortage of transportation is the most serious factor in industrial re-adjustment. Why then, everyone who makes or sells motor trucks is asking, is it so difficult to get credit?

When it is admitted that motor trucks are essential, and any argument that they are not is banal, some manufacturers and dealers cannot see why they should not be given preference at the banks. It may be logical that they should but it is not being done. There is not much sentiment in banking these days. The man who can present a satisfactory statement of assets and liabilities is the one most likely to get the cash he is after.

No Restriction Exists

There is no reason whatever, however, why the motor truck manufacturer or dealer who can give a bank a clean bill of financial health, should not get the accommodation to which he is entitled as a reputable business man. If the banker doesn't give it to him it means either that the bank has already loaned to the limit of its resources or that the banker doesn't know his business and therefore has no place in his profession.

There apparently are a lot of bankers in the country still laboring under the misapprehension that some Federal Reserve edict, official or unofficial, has gone forth against the acceptance of automobile paper of any kind. When a dealer or maker runs up against an individual of this type the only thing left to do is to educate him. If he can't be educated and shown the light, the only alternative is to leave him to his own fate and hunt up somebody else to do the financing. The answer to a large part of the credit troubles of the motor truck industry is that bankers have not been sold on the fact that the truck is just as important an element of transportation as the railroad. In many cases it is even more important.

Within the past few days the report has become current in the industry that the railroads are responsible for the difficulty encountered in getting truck credit. Weight is lent to this story by the fact that field representatives of a large automobile financing company have reported to their headquarters here that in half a dozen instances they have been told by bankers upon whom they have called that nothing can be done for motor trucks because trucks are hurting the railroads. So far as can be learned, however, this is an isolated case.

Bankers in New York who are heavily interested in the automotive industry declare they do not believe there is a vestige of truth in any allegation that banks as a whole are inclined to pamper the carriers at the expense of motor trucks. Other financing companies make the same assertion.

A vice president of one big bank deeply interested in the automotive industry declared he would wager any amount that truck manufacturers were getting all the credit to which their financial statement entitled them. He said he believed they were being favored rather than the reverse. The same declaration came from the financing companies. They said they were even more ready to aid truck dealers than passenger car dealers. They are going as far in that direction as their own reduced lines of credit will let them.

A dozen or more railroad executives have stated that they welcomed the assistance given the carriers by the motor truck as a feeder for their lines and that they would shed no tears if motor trucks absorbed the lion's share of the short haul business because the carriers never had found it profitable.

It would be unfair to accuse the executives of insincerity and there is no reason to think they are. They are keen business men and they realize that conditions have changed since the earlier days of the automotive industry when they were its avowed enemies. They know that it will be years before the carriers can hope to catch up with the business of the country. Some of them even are thinking seriously of going into the truck field themselves to feed their own lines.

Therefore if bankers who have invested in railroad securities feel they are serving their own interests by bucking the motor truck industry in the expectation that they will enhance the value of their investment, they simply have not kept up with the trend of modern business thought and are not as farseeing as the men who are running the railroads.

Receiver Appointed to Handle Management of Jones Motor Co.

Kansas City, Mo., Aug. 21—Henry F. Gee of Wichita, Kan., has been appointed receiver of the Jones Motor Co., makers of the Jones Six, by Circuit Judge Kimbrough in the Federal court here and the management of the company has been turned over to him until the matter receives satisfactory adjustment.

The Davidson Motor Co. of Mineral Wells, Texas, brought friendly suit for $9,225 for cash advanced and commissions on the sales of cars and trucks. The Jones company is said to have assets of $750,000. Representatives of the Davidson company have stated that they believe the Jones company to be solvent and showed a willingness to a plan whereby bankruptcy proceedings should be unnecessary. Difficulties met in obtaining sufficient credit and inability to discount their paper are reasons assigned for the present trouble of the Jones company.

Use of Lake for Shipment Aid in Hastening Car Deliveries

Cleveland and Detroit Send Assembled Automobiles by Freighters to Chicago for Distribution

CHICAGO, Aug. 20—The plan of helping to relieve the freight congestion and to expedite deliveries of automobiles to points north, south and west through lake shipment from manufacturing centers to Chicago has met with greater success than its sponsors hoped for. Because of keen interest shown by shippers in the possibilities it is probable that the city will become more and more of a distributing center for automobiles through lake shipments until rail transportation facilities are materially improved.

The municipal pier with its great storage capacity is the center for distribution. It has no rail connections but Chicago is well equipped with railroad lines and it is a small matter to move the automobiles, which are shipped by the manufacturers fully assembled, to the freight cars to be sent to different parts of the country for delivery. Those consigned to Chicago and vicinity are called for by the dealers or driven away by the purchasers.

At the time of the armistice when the Government was the tenant the pier held something like 5000 War Department motor trucks in storage. After the cessation of hostilities these were altered on the pier to meet the new uses of which they were to be put and were turned over to the different states to aid in highway construction.

Thousands of cars have been received at the pier from most of the best known manufacturers in Detroit and Cleveland. Five freighters owned by boat companies in these two cities, with a capacity each of from 150 to 240 cars, land at the pier, those from Detroit making weekly round trips and those from Cleveland covering the round trip in eight days. Two companies organized to promote automobile shipments by lake act as the forwarding agents here.

SELLS STOCK TO EMPLOYEES

Grundy Center, Ia., Aug. 20—Harris Thornton, Ford dealer for this territory, has solved the question of efficient helpers and satisfied workmen by incorporating his Ford agency for $35,000 and selling a large block of stock to his men. So far they have taken $15,000 worth for their own investment and the men at the branches of the company at Reinbeck and Wellsville have also taken advantage of the stock offer to become interested in the business. Mr. Thornton says this makes them better workmen, gives them something besides their wages to work for and results in giving the car owner real service, that pays in dollars and cents on each job that is turned out by the men.

Progressive Methods Help Summer Sales of Tractors

Illinois Farmer Points Way to All Year Round Business by Plowing Early

BLOOMINGTON, ILL., Aug. 20—Alert tractor dealers of central Illinois are not permitting any dull months. In this section it has been the custom for most of the farmers to plow for wheat late in the Fall and tractor dealers have not been figuring on big business until the Fall months.

Lawrence Funk, who was able to show the highest wheat yield in all central Illinois, plows his land in July and August just as soon as the grain has been cut and threshed. Tractor dealers have been making much capital out of this showing and have been going from farm to farm urging early plowing and incidentally the investment in a tractor. A year ago Mr. Funk decided to experiment in early plowing. He plowed sixty acres as soon as threshing was over and left twenty acres to be plowed two months later. This summer he compared the yield. The early plowed tract produced fifty-two bushels of wheat to the acre while the late plowed yielded only thirty bushels. The difference was so great that he decided to plow every acre as early as possible this year.

He massed all his tractors and had the job performed in the minimum of time. The dealers in power farming machinery procured all the data possible on this performance with the result that many tractors will be sold in the summer in Central Illinois.

Replacement of Large Machines

Small threshing outfits operated by a tractor are displacing the large outfits handled by a steam traction engine. As with the original tractors of large size and weight, now being succeeded by the smaller type, so is the small separator growing in popularity and helping to make sales of tractors. One of the best illustrations of this fact, was recorded upon the farm of J. M. Birckelbaw, west of Bloomington.

A crew of seven men and two boys, working with one of these small threshing outfits and tractor, threshed 1,800 bushels of oats in a single day. The cylinder of the separator measured 24 by 36 in., while the tractor produced 27 belt horse power. Farmers are forming groups to purchase these small outfits and are thus enabled to complete their harvesting much earlier than those in the large runs, using huge machines and traction engines.

Tractor dealers of Logan county, Ill., arranged a successful demonstration in connection with the annual Chautauqua, on Aug. 11. The exhibition of power farming took place on a site near the Chautauqua grounds and the dealers thus secured the advantage of a huge crowd. The demonstration was competitive and the rules were strictly enforced. The depth of the plowing was fixed at seven inches. Twenty machines took part and the exhibition was among the most successful of the kind ever arranged in central Illinois. The dealers believe that the event will prove a valuable stimulant to the sale of tractors and other power farming machinery during the Fall.

Tractor dealers of Cass county gave a very successful demonstration at Virginia. The affair was under the auspices of the county farm bureau and was managed by R. W. Dickensen, county advisor.

GASCO CO. INCORPORATES

Lancaster, Pa., Aug. 22—The Gasco Mfg. Co. is being incorporated as a close relation to the General Supply Co. & Jobbing House. The officers in the new company are G. H. Shreiner, president; G. L. Whallon, vice-president; R. L. Whallon, secretary, and R. W. Shreiner, treasurer. The incorporation is for $50,000, and the plant will be in the new building at 615 North Prince street, 28 ft. by 90 ft. The products at the start will include air compressors, steering wheel locks and valve grinders. Roy W. Shreiner is manager of the Lancaster Automobile Show.

DEALERS REDUCE TAX

Cincinnati, Aug. 26—Local automobile dealers and garagemen are thoroughly in accord with the occupational tax to be levied in Cincinnati and are willing to do their share but they believed that a tax of $10 a dealer with $5 additional for each employe was out of proportion to the taxes being paid by other lines of business.

Dealers offered to co-operate with the tax committee in making a survey of the automobile trade in the city to gather data which they claimed would support their contentions that they were just making both ends meet. This and other statements made by the automobile men met with a willing ear and a reduction has been agreed on.

ROAD BUILDING HELD UP

Kansas City, Aug. 23—The Mid-West Road Builders Association at their regular meeting here August 7 passed a resolution stating that the Inter-State Commerce Commission had not dealt fairly with the road building organizations in the allotment of open top freight cars. The fact was brought out that but very little road work had been done in Missouri in Kansas in the past year due in a large measure to inability of road builders to secure materials.

TRACTOR COMMITTEE AT COLUMBUS

Columbus, O., Aug. 21—A special committee from the national tractor demonstration and show committee consisting of Finley P. Mount, E. J. Cottins, C. S. Brantingham and J. E. Everson has been visiting this city going over the plant at the Ohio state fair grounds where the tractor show is to be held. Matters concerning the event were taken up by the committee with the members of the Columbus Tractor and Implement club.

Purchase of Smokeless Coal Holdings by Ford Completed

Confirmation Made of Previous Report — Rumored That Other Deals Are Under Way

DETROIT, Aug. 20—Reports that the Ford Motor Co. had purchased the holdings and leasehold of the Nuttall Smokeless Coal Co. in the New River district of West Virginia, were confirmed to-day. The tract purchased comprises 4000 acres and the output is expected to equal that of the Banner Fork property in Kentuucky purchased by the Ford company, a few weeks ago.

At the time of the latter purchase officials of the company said the output would be approximately one-third the requirements of the Ford properties but no statement could be secured as to negotiations for other properties on or adjacent to the D. T. & I. Railroad bought by Ford at the same time. The presence of Percy Haly, holder of extensive coal properties in eastern Kentucky, in Detroit a few days ago however, gave rise to the report that a big deal was being negotiated. Ford officials refused to-day to make any statement regarding other deals in prospect. W. H. Smith, research engineer, who is looking after that end of the company's business in the absence of Chief Engineer W. B. Mayo, contented himself with the statement that he "was no prophet" when asked regarding other possible deals about to be consummated.

Conference With Ford

Mr. Haly during his visit here refused to say what his mission was in Detroit though he admitted having held conferences with officials of the Ford Co. Mr. Haly besides owning some of the biggest mines in Kentucky near the West Virginia line, is in charge of the vast properties of the late John C. C. Mayo, one of the largest operators in the eastern Kentucky district.

Mr. Smith would make no statement as to the consideration involved in securing the Nuttall properties. He said the product of the mines was of different grade from that of the Banner Fork and was purchased for use in certain plants of the company where a lower grade of coal is most adaptable.

MOLINE PLOW GETS ENGINE PLANT

Moline, Ill., Aug. 21—The Moline Plow & Tractor Co. has acquired the Root & Vandervoort engine shops at East Moline. The stockholders of the latter concern will be reimbursed with stock in the Moline or other interests controlled by John Willys. The deal does not include the automobile department of the Root & Vandervoort Co. This company has been producing the engines used in the tractors and most of the other products distributed by the Moline Plow Company and the general operation of the engine works will not be materially changed by the new control.

First of Seaplane Fleet Reaches Detroit from East

Regular Schedule Is Promised Carrying Passengers and Wide Variety of Freight

DETROIT, Aug. 14—Passenger and freight air service is promised on regular schedule beginning Tuesday by the U. S. Aerial Navigation Co., of which Lieut. Thomas F. Dunn, formerly of the United States air service, is general manager. The first of the company's fleet of nine seaplanes reached Detroit yesterday morning from Philadelphia and two others will follow in a few weeks. The entire fleet is expected to be in operation by mid-winter.

The company has established passenger stations at the Statler hotels in Detroit, Cleveland and Buffalo and now is completing plans for freight nad package depots. The first plane which will inaugurate the service has a passenger capacity of 24 and its tonnage capacity is 6,200 pounds dead weight. Lieut. Dunn said today that the company would handle a wide variety of freight including live stock, and in response to a question regarding safety cited the fact that insurance rates for air travel are less than for railway transportation. Lieuts. Dunn and W. H. Alexander will pilot the first ship and other ex-army flyers will be added as rapidly as planes can be secured.

One of the freatures of the construction of the plane is the suspension of the fuel tanks beneath the wings permitting possible leakage to fall into the water, eliminating fire danger. The tanks are carried in a manner similar to bombs and in case of fire or other trouble can be released and dropped into the water by the operation of a lever. The plane starts and stops on the water and its flying route as laid out always will be within easy reach of safe landing places. It is fitted with two Liberty engines of 400 horsepower and has a wing-spread of 110 ft. Six passengers were brought to Detroit from Philadelphia, the trip being made with but one interruption, low-grade gasoline clogging the engine and compelling a stop at Amherstberg, Ontario.

Lull in Automotive Sales Is Felt by Southern California

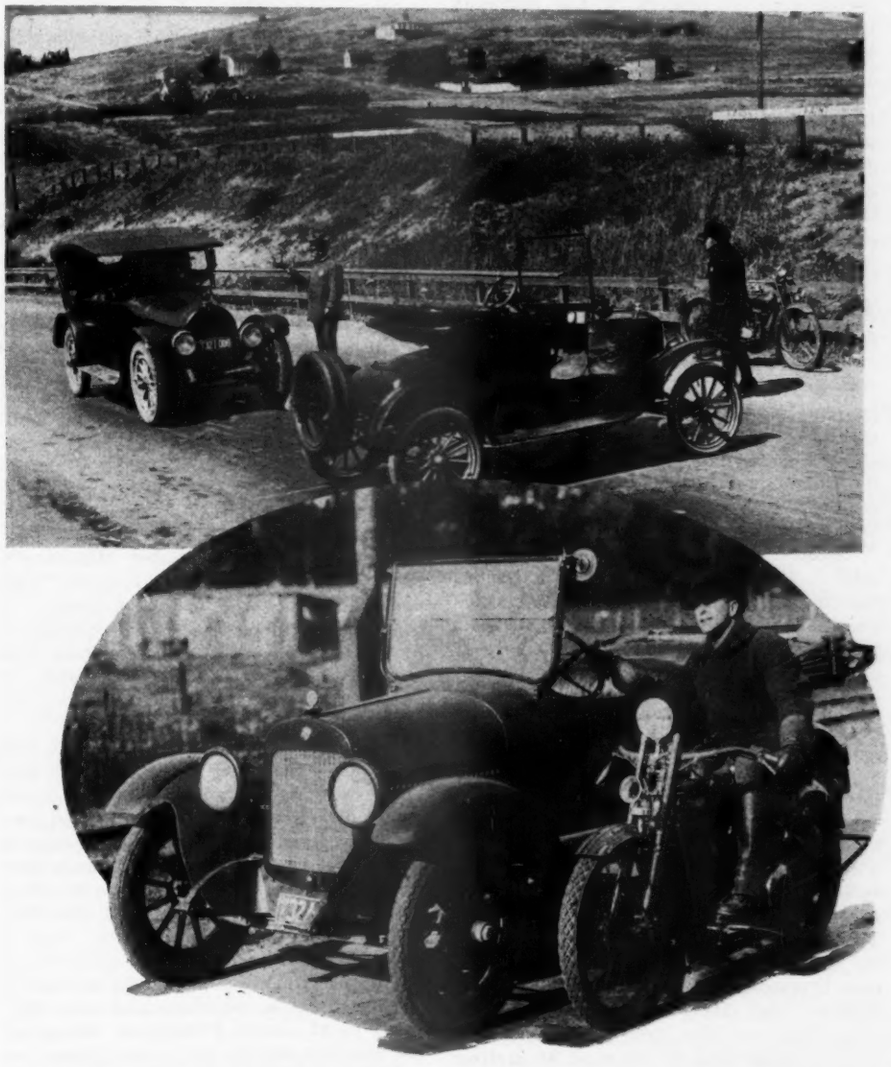
Slackness Is Attributed in Part to a Tightening Up in Sales Methods

LOS ANGELES, Aug. 16—The slowing up in the sales of automotive vehicles that has been apparent in other parts of the country for three or four weeks is now being felt in Southern California. Movements such as this usually sweep westward across the country. The slump in demand is pronounced in all lines. Whether it is the result of the attitude of banking concerns in restricting credit is hard to determine. This affords a general alibi, at least, but it usually happens that the prospective purchaser who can show he is a good risk gets the money. The deduction, therefore, is that there are few good risks or the general desire to buy new motor equipment is waning.

Automobiles, trucks and tractors are accumulating. In fact they are going into storage. It is probable that the total value of motor equipment in warehouse in Los Angeles to-day is in excess of $3,000,000. It is known that warehouse capacity is exhausted. A municipal warehouse at the harbor is now being used to store in. A few days ago it was estimated there were 300 cars there. Truck shipments are coming through with more regularity than for many months. In fact there is no semblance of shortage except where certain equipment, such as steel wheels and pneumatic tires were ordered as factory equipment.

The slump in demand is not local only. It is even more pronounced in the rural communities. Business there is more seasonal and indications now are there will be very little improvement before the latter part of the year. A part of the slack demand may be attributed to a tightening up on sales methods. The long-term contract is not nearly so popular with dealers as it was formerly.

HOW SAN FRANCISCO DEALERS COMBAT THE CAR THEFT PROBLEMS



The San Francisco Motor Car Dealers' Association and the police department working in close cooperation are reducing the number of automobiles stolen and greatly increasing the number recovered. Above shows a Ford run into the middle of the street as soon as word is received of a car being stolen. The policeman stops cars of the make stolen as they come along. After he does so he asks for the operator's card or license certificate and then requires him to write his name to see if the signatures compare. Below demonstrates the efficiency of a traffic officer in guiding a recovered car. He puts one foot on the running board and the other on the motorcycle steering the automobile with his right hand. When he stops he pulls the switch, then reaches in and pulls the emergency brake

Truck and Tractor Message Carried by Senator's Party

Dealers, Distributors, Farmers and Bankers to Be Reached by Expedition Through Southwest

New York, Aug. 23.—An expedition to teach the gospel of the motor truck and tractor throughout the southwest left St. Louis yeserday, headed by Arthur Capper, United States senator from Kansas and publisher of a string of influential farm papers. F. W. Fenn, secretary of the motor truck committee of the National Automobile Chamber of Commerce, is the senator's personal guest and will supply much of the ammunition which will be fired along the way.

The main purpose of the party, which numbers about 30, including 20 automobile advertising men, is to conduct missionary work among the bankers in the territory visited. The trip will consume two weeks and in each city and town visited the members of the party will interview not only bankers but farmers, dealers and distributors.

Selling the Banker

Bankers will be sold on the essentiality of trucks and tractors. Especial emphasis will be placed on their value in the great agricultural sections of the southwest as an aid to economical production and to make up any deficiency in farm labor. They will be told that they offer the best kind of security for loans and that liberal credits for their sale are entirely justified. They will be told the views on this subject of the leading bankers and financial experts of the country. Some sections of the southwest still are laboring under the delusion that a Federal Reserve edict has gone forth against the acceptance of any kind of automotive paper.

Where the farmers need education as to the value and economy of trucks and tractors, they will be educated. Dealers and distributors will be given advice as to the best means of increasing sales and they will be encouraged to new effort. The whole trip will be made by automobile.

From St. Louis the party went to Topeka and from there to Kansas City. They will then go down through Oklahoma into Texas and back to Kansas, Nebraska and Iowa.

Senator Capper is one of the country's most earnest advocates of motorized farms. He hasn't a horse on his own estate, which embraces several thousand acres. He also believes that truck and tractor makers have not visualized the wonderful market which exists in the southwest which has had bumper crops and will be assured of great prosperity if only the railroads can get their products to market.

"In my opinion," he says, "the potential market in the middle west has not yet been captured by the motor truck manufacturers. Despite economic buying limitations, which in themselves will disappear each year more and more as a higher level of prosperity is reached through the extension of power farming, there exists to-day a market almost untouched and under-developed."

New Handley-Knight Factory to Start Work in September

Kalamazoo, Mich., Aug. 20—Production at the new Handley-Knight factory will start during the latter part of September. The manufacturing unit has been completed though there still is much work to be done on the power house and in the installation of machinery and equipment. Materials are reaching the plant in a steady stream and everything will be in readiness as soon as machinery is installed.

The official personnel has been perfected and all officers of the company now are housed in the company's offices on North Pitcher street. In addition to J. I. Handley, president and general manager, the directory of officials includes H. L. Dunn, purchasing agent; A. E. Schaaf, in charge of manufacturing; J. Tallmadge, sales manager; F. L. Mowder, comptroller; Walter Olson, production manager and D. B. Williams, advertising manager.

Association Is Formed by Seattle Automotive Trades

Seattle, Aug. 23—Organization of the Seattle Automotive Trades association, embracing eleven different trade divisions, has been perfected. Chief among the objects of the organization is to instill a feeling of confidence in its membership on the part of the general public.

"Another object we are striving for," said J. H. McDiarmid, acting chairman, "is this: The small man through his acquaintance with the larger man can learn methods of doing business and operating which will help him solve his own problems and make him profit by the other man's experience."

Milwaukee Addition for Ford

Milwaukee, Wis., Aug. 23—Announcement is made that the Ford Motor Co. will proceed with the construction of a two-story addition, 150x340 ft., to its present six-story assembling plant here. The enlargement will provide facilities for the assembling of engines and other new processes, including manufacture of fenders and other sheet metal work, enameling, etc. The daily motor capacity will be from 135 to 150, and 80 skilled men will be added for this purpose. In all, the force will be increased to approximately 600 when the addition is ready for occupancy.

Freemont, Ohio, Aug. 18—The Hodes-Zink Co. has leased a two-story factory building and will start manufacturing tops for Ford cars. Machinery is being installed and operations will be begun within the next two weeks.

Railroads Are Directed to Give Priority to Ohio Road Material

Highway Improvement in the State Has Been Held Up Because of Its Lack

Columbus, Ohio, Aug. 20—All railroads in the state have been ordered by the Ohio Utilities Commission to give priority immediately to the transportation of road building material and machinery for highway improvement. This action was taken at the behest of the Ohio Highway Commission who informed the commission that the welfare of the state demanded the movement of road building materials and machinery. It is estimated that the state would have spent more than $1,000,000 up to this time this year if the transportation has been afforded.

Sacramento, Calif., Aug. 21—Sufficient names have been secured for the highway bonds interest initiative to secure it a place on the November ballot. The measure provides an increase in the interest rate of the $40,000,000 issue voted last year, from 4½ to 6 per cent; and will place the burden of paying the interest on the state at large instead of on the counties in which the money is spent as is now the case.

If the measure is voted by the people it will mean the highway system will be completed within two years. If it is not the work of developing good roads in this state will lie dormant until the bond market comes back to 4½ per cent.

Lansing, Mich., Aug. 23—The Michigan State Good Roads association will meet here Sept. 1, 2 and 3 to concentrate influences to push the Townsend bill now pending which appropriates $425,000,000 for a national highway system. The construction of the proposed system is to be urged along the line of necessity, in the interest of the parcel post and national defense and for the relief of transportation in manufacturing.

Pensacola, Fla., Aug. 21—This city will have more than 100 miles of paved and improved roads radiating from it in every direction if the present plans of the Good Roads Commission of Escambia county are carried out. It has been proposed to have the voters decide on Sept. 15 on a $2,000,000 bond issue for this purpose.

Kansas City, Mo., Aug. 21—The Kansas Good Roads association and the Missouri Good Roads Federation are using the moving picture as a chief means of publicity in their campaigns among the voters for better road laws to be voted on Nov. 2.

HYDROAIRPLANES ON TRIP

Louisville, Ky., Aug. 21.—A new era in transportation in Louisville was inaugurated at 9:30 o'clock this morning, when two hydroairplanes of the Ohio Valley Transportation company departed on their initial trip to Cincinnati at 11 o'clock.

(*Continued from Page 13.*)

arranged that four pistons from each of two cars should be put into the engine of the third. Thus when the engines were reassembled, no engine had its original complement of pistons.

The change of pistons was made out in the open on the track without even the convenience of a vise or bench, the pit wall serving as a bench. Only such tools as a mechanic carries in his kit bag were furnished each pair of mechanics. A chief mechanic who rode as a passenger in the car assigned to him and his helper did the reassembly. Considerable rivalry existed between the crews to see who would tear down and rebuild their engine most rapidly. One crew tore down their engine in two hours and fifteen minutes and had their engine running in one hour and thirty-five minutes after starting to reassemble. Their car was ready to retest in one hour and fifty-five minutes after they started to rebuild.

Comparative Acceleration Tests

As soon as the cars were ready, on the afternoon of the 30th, they were again given acceleration tests exactly as done on the previous afternoon. It is interesting to note here that the temperature was from 94 to 98 degrees Fahr. each day during the tests. The same driver was used in all tests so as to remove the human variable which would have occurred if three different drivers had been used. At the finish of each series of acceleration tests on the last day a flying half mile with wide open throttle was clocked. This was done to prove that the pistons would not stick under sustained high speed.

The acceleration tests of both days are shown in the accompanying table. The maximum variation was five per cent which is less than the average error in speedometer readings. For this reason the results can be considered substantially the same. The fact that they were uniform indicates that the pistons were interchangeable. The maximum speed tests in which the same speed was made by two cars was only another proof of uniformity. The same is true of the car weights where there was a difference of only 18 pounds less than one-half of one per cent.

Piston Clearance Variation

In the table of piston clearances attached it will be noted that they varied from 0.001 in. to 0.00575 in. This is a wider range than most manufacturers of engines with cast iron pistons would care to use. Yet there was never a piston slap audible during the whole trial either before or after the change of pistons. Neither was there any sign of pistons sticking.

It is interesting to note Mr. Ricker's remarks regarding tight pistons. "Every piston and cylinder bore was carefully micrometered and the clearance recorded for the initial piston arrangement. As the pistons were arranged to certain cylinders by me without regard to clearance, and not left up to the mechanics' selection, some fitted unusually tight, so much so that I felt the test would not be a success for I could not believe a piston fitting so tight would drive a car 60 miles per hour for half a mile without its sticking.

"However, I was determined to see the test through on the lines originally outlined, whether or not it was a success. Howard Wilcox, who was driving, was equally dubious about it when we took that car out to put it through its acceleration test.

"Now I'm pleased to say I was mistaken but I did observe something which partially confirmed my original assumption. Wilcox drove that car only about a mile before we made the first acceleration test. The Motometer ran up to the top showing a hot engine. Six acceleration tests required four laps of the track or 10 miles running. He drove 40 to 50 miles per hour between tests. By the time we had run 10 miles the Motometer indicated that the engine was at normal temperature and it stayed there throughout the maximum speed test which followed when that car did 62 miles per hour for half a mile with four passengers and with top and windshield up.

"This proved to me that the pistons were probably tight when we started but were given a permanent clearance in a few miles running so that each piston would conform to its particular cylinder. The fact that the engine cooled down shows that the cause of excessive friction had been removed.

"The failure of the pistons, which were unquestionably tight in their cylinders, to seize at sustained high speed and to reshape themselves automatically to conform to their particular cylinder is the outstanding feature of this phase of the test.

In conclusion Mr. Ricker said, "The name 'Cole Constant Clearance Piston' which you have given this new advancement is particularly fitting, for the piston seems to expand if too loose and contract if too tight, keeping the clearance constant. During the whole test I could never hear even the slightest piston 'slap' whether the engine was warm or cold, and the test proves you cannot stick them."

An Achievement in Engineering

An aluminum piston that will not "slap" or stick is a combination which engineers have striven to obtain for years. These tests seem to indicate that Cole has obtained at least a close approximation to the requirements, but of equally great importance is the fact that the piston may be installed without close and exacting regard to fitting and selection.

DATA ON COLE A. A. A. TEST
Indianapolis Motor Speedway
July 29th and 30th, 1920

Cars Used—Three "Cole Aero Eight" standard seven-passenger touring cars selected at random from the sales room floor of the Indianapolis agent.

Driver and Passengers—All cars were driven by one person, Howard Wilcox, in order to assure uniformity in handling. During tests Chester S. Ricker, technical representative of the A. A. A. and his assistant, W. C. Buser, rode in the car under observation. Each car carried another passenger, the mechanic assigned to look after the interchanging of pistons on that particular car.

Weights—

Car No.	Car complete with tanks full but without spare tire	Passenger Wt.	Total Wt.
1	3780	650	4430
2	3798	638	4436
3	3792	690	4482

The fact that all cars are a trifle slower is to be expected because the tests were run immediately after the pistons had been interchanged and the cars did not have over one mile run before the first acceleration test was made. Had time permitted of their being run 40 or 50 miles before the second tests were made, there probably would not have been this variation.

Car No.	Speedometer Reading	Test July 29 with original pistons	Test July 30 with pistons taken from two other cars	Variations in Percent
1	10-20	5.7 seconds	5.8 seconds	1.7
	10-30	10.7	11.2	2.2
	10-40	17.6	17.7	0.5
	10-50	26.06	25.80	—0.1
2	10-20	6.0	6.0	0.0
	10-30	11.4	11.6	1.7
	10-40	17.5	18.2	3.8
	10-50	25.60	26.53	3.5
3	10-20	5.4	5.7	5.2
	10-30	10.8	10.8	0.0
	10-40	17.5	17.8	1.6
	10-50	26.36	27.28	3.4

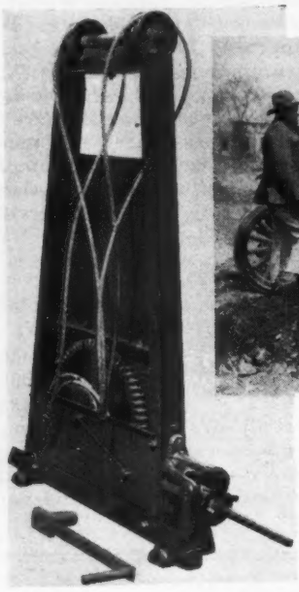
Maximum Speed Test—At the conclusion of each series of acceleration tests on the last day a maximum speed test for a measured half mile was made with each car.

Car No.	Time, seconds	Average M.P.H.
1	29.6	60.8
2	29.0	62.0
3	29.0	62.0
Average		61.6

Reliance Truck

THE Reliance Motor Truck Co., of Appleton, Wis., are now confining their production to two truck models, the 1½ ton and the 2½ ton. Both models are essembled and are very good examples of truck construction with standardized units. The demand for pneumatic tired trucks has been so strong that 80 per cent of this company's models now go out with pneumatic tires.

The Reliance Truck Co., has a well equipped plant and own considerable land adjacent to the factory on which it is planned to erect new buildings to take care of the increased production.



Columbian Lightning Hoist which is described on the adjacent page

Both trucks being similar in design we confine our description to the 2½ ton model. The engine used on this truck is the Buda H. T. U. four cylinder, 4¼ by 5½ in. bore and stroke. This engine is block cast, the block being separate from the crankcase. The crankcase is in two sections, the lower section containing the oil reservoir.

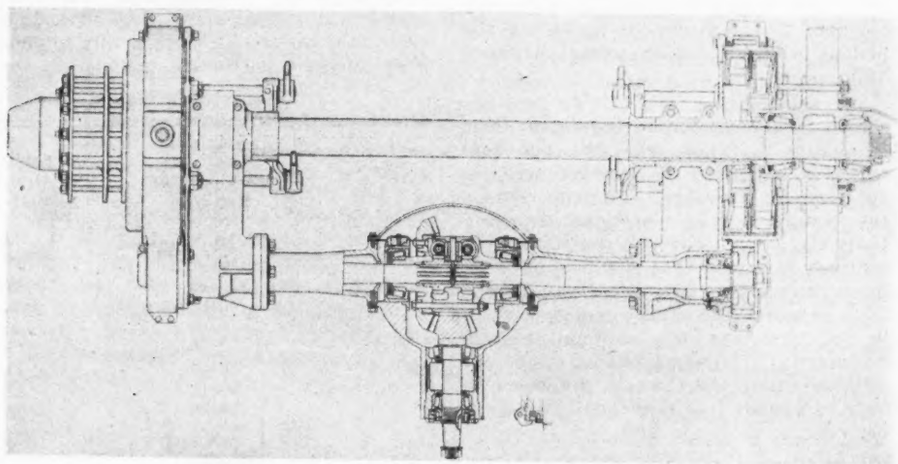
The lubrication of this engine is of the full force speed type. The oil is pumped from the lower reservoir to the three main bearings and connecting rod bearings through the drilled passages in the shaft. Special leads through the connecting rods conduct the oil to the wrist-pin. The camshaft bearings are also pressure lubricated. A special feature of the oiling system is that the design of the crankcase is much that all sediment tends to collect in a trip at the bottom of the case.

The clutch and transmission are in unit with the engine. The clutch is Fuller make and is of the multiple disk dry-plate type. Asbestos rings are fitted between the plates. No adjustment is required on this clutch except that for the clutch pedal to bring it to position for the driver's foot. The clutch runs dry and needs no lubrication except that provided for the throwout bearings. The transmission is of the Cotta make and is a force feed constant mesh type. It is located amidship. With this transmission the speed changes are made by the engagement of heavy jaw clutches which slide on the shaft and lock with the corresponding clutches on the sides of the gears. Thermoid Hardy flexible disk joints are used for the universals.

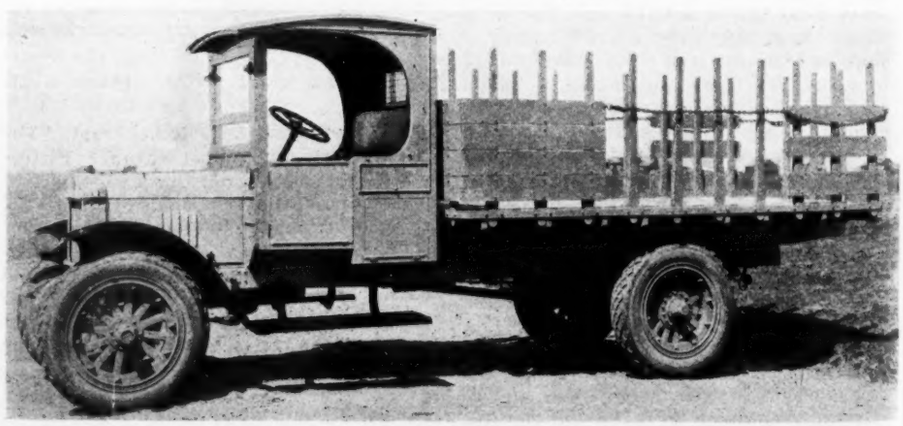
One of the features of this truck is the rear axle. It is the Badger external gear axle which is manufactured by this same company. The Badger external gear axle gives a gear reduction from a combination of the regular bevel pinion and ring gear with an external spur gear drive at the axle end. The illustration shows this construction very nicely. All moving parts of this axle are inclosed and are dust-proof. The gear housing is oil tight and the gears within revolve in an oil bath at all times. The load carrying portion of this axle is a chrome nickel-steel forging and is entirely separate from the driving end of the axle. A Powerlock differential is used to prevent loss of power due to the spinning of wheels and to permit of efficient operation upon unimproved and slippery highways.

The steering gear employed on this truck is of Ross make, it is of the solid screw and nut type. Large bearing surfaces are provided in this steering gear and no adjustments are required. A Stromberg carbureter fitted in combination with a Pierce governor is part of the engine equipment. Eisemann magneto and generator is employed, and the storage battery is provided for the lighting system.

The model 10-A, which is the 1½-ton truck equipped with power tire pumps, 36x6 in. front tires and 38x7 in. rear tires, lists at $2,950. The model 20-B. which is the 2¼-ton model complete with 36x6 in. front tires and 42x9 in. rear tires and power tire pump, lists at $3.800.



The Badger external gear drive axle which is standard equipment on the Reliance truck



The Reliance truck equipped with pneumatic tires is proving to be a strong seller

Columbian Lightning Hoist

The Columbian hoist is a hand operated truck hoist of narrow, compact construction, occupying only about 8 in. space on the truck frame. Allowing 3 in. for the thickness of lift arms to be attached to front of body, the hoist can be mounted within 11 in. of the driver's seat. This represents economy of space and is an advantage where chassis space is limited. The hoist is 66 in. high which puts it about level with the average cab top and permits passing under low head room.

It is claimed that the bevel gear construction will enable the operator to dump the average load in from forty-five to ninety seconds. As the body elevates, the hoist inclines slightly toward the body as provided in a spring device where the hoist is attached to the truck. This is to provide perpendicular pull on the cables at all times and minimize the labor of lifting. A brake and ratchet device provides a means for stopping in any position. The Columbian hoist when properly installed has a dumping capacity up to five tons, though it is claimed it will work successfully with heavier loads.

In order to make this outfit universal both in capacity and adaptability to all makes of trucks, the manufacturers make one model which is suitable for all purposes. This simplifies matters in regard to parts, as all parts are universal and one part list suffices. Columbian hoists are easily attached. The body, of course, takes more time, as the lifting arms which are furnished with the hoist have to be bolted to the body and lunges have to be riveted or bolted to chassis frame. The idea should be kept in mind in mounting a dump body to provide plenty of overhang or counterbalance.

The Columbian Steel Tank Co. lists the hoist at $125.00 f.o.b. Kansas City, Mo., in addition to which there is an attaching fee when same is mounted in dealer's or distributor's shop, such as individual circumstances warrant.

New Starting Device

A starting device which is gearless and noiseless has recently been developed by A. G. Williams, 1156 E. 56th St., Chicago. Instead of using gears, a cone provides the means of engaging the engine flywheel, and in order to obtain the best results, it is necessary to cone the flywheel slightly in a suitable manner.

The starting mechanism proper embodies a small cone wheel mounted on a motor shaft, supported at one end by a bracket and the other end connected to the rotor of the starting motor, as shown in the illustration. A means is provided for advancing the cone for engagement, and also for disengagement after starting. The rest of the starting equipment is identical with that now in use.

One of the big advantages claimed by the inventor is that the action is just as positive and much cmoother, also, that in the case of trouble, such as the breaking of teeth in the gears of the starting system types in popular favor at present, it is much easier to reface the cone or replace the parts than to install a new set of gears. This starting device is not yet in production.

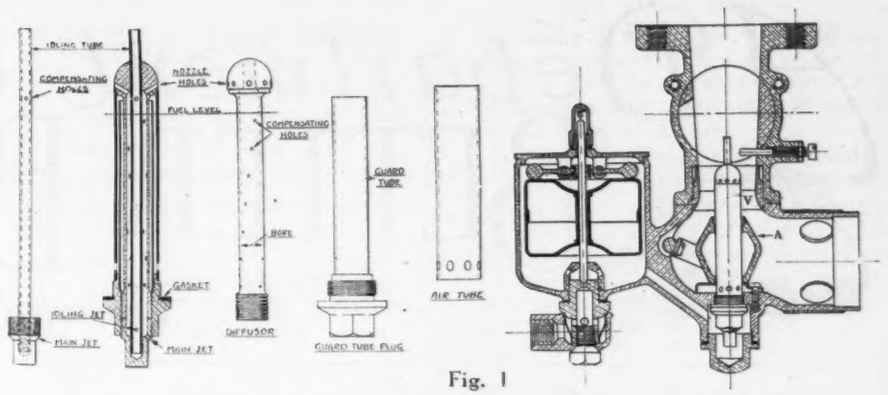


Fig. 1

The Claudel Carbureter

THE Claudel carbureter, famous in the European automotive field for the past twenty years is now being built in America by the Claudel Carbureter Co., Inc., Long Island City, New York.

The Claudel is really a combination of two types of jet, one, the main jet, Fig. 1, of constant flow per unit of time; the other, shown as a series of nozzle holes, of suction-controlled flow. Fig. — indicates the fuel level when the carbureter is at rest. Fuel from the float chamber flows through the main jet into the diffusor, then through the compensating holes into the reservoir of diffusor bore. It also flows through the idling jet into the idling tube, the level in the three tubes being the same as that in the float chamber.

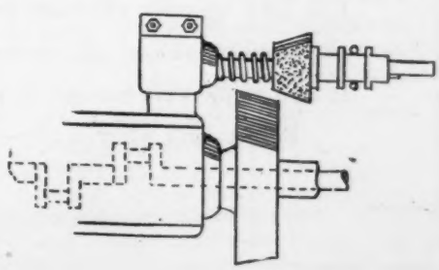
Air at atmospheric pressure enters the outside base or air tube of the diffusor column, passes up this outer sleeve and over the top of the gasoline guard tube, which prevents the fuel from overflowing. As the throttle is opened gradually and the suction in the diffusor increases, thereby lowering the liquid level in the diffusor bore, a series of air bleed or compensating holes are progressively uncovered. Through these holes the air rushes into the ascending column of gas vapor and out the nozzle holes at the top of the diffusor in a finely broken-up gasoline emulsion. The higher the suction acting upon the diffusor, the lower will be the level of gasoline within it, and therefore, more of the compensating holes will be uncovered, permitting a greater dilution of the mixture.

At the higher speeds the diffusor is practically emptied and twenty-one spirally arranged air bleed holes are in action. As the gasoline globules are lifted by the suction, they must pass through a barrage of twenty-one air guns shooting at right angles into the ascending fuel. This turbulent mixing effect produces a finely divided fuel emulsion ideal for rapid flame propagation, extreme economy and high power. The diffusor discharge is in approximately the ratio of fifteen parts of air to one part of gasoline by volume. This thorough intermixture of air and gasoline before it enters the carbureter barrel is the Claudel method of breaking up the heavy fuel of today for extreme economy.

The idling device is incorporated in a central tube projecting up into the depression of the barrel throttle where a strong pull is exerted on the idling jet for low-speed action. The barrel throttle is slotted to pass around the idling jet for low-speed action. The barrel throttle is slotted to pass around the idling jet and the only adjustment on the carbureter is a screw extending into the air space to partially block off the area of this slot as desired. Screwing it in lessens the air area and enriches the idling mixture. Screwing it out makes the mixture leaner.

In the American type of Claudel shown in Fig. 1, a decided improvement has been incorporated for strangling the air by means of a sliding air cone, controlled from the dash. This device assures quick starting and warming up in cold weather. The streamline air cone, concentric with the diffusor, may be raised into contact with the venturi, shutting off the air supply and putting the full suction on the diffusor. In this position it is only necessary for the cylinders to exhause the air in the top of the carbureter before the diffusor discharge must commence. This action is instantaneous, as the volume is small.

The Claudel is being built in a number of standard S. A. E. vertical sizes. A horizontal model will be announced later. Special models, however, for special installations are built to order, including airplane and duplex designs.



A Department of BETTER BUSINESS

Conducted by **Ray W. Sherman**

Attaboy!

IF you'd like to have the kind of trade,
That's the kind of trade you'd like;
You don't have to wait till the clouds roll by
And the world begins to hike.
For there's trade all around you every day;
If you'll fight it will come through,
If you think that it isn't it never is,
For it isn't your trade—it's YOU.

WHEN a man sits down in the depths of gloom,
And the whole wide world goes wrong;
The tune isn't changed a single bit—
It's just the words of the song.
For those who go almost always get
And the fighter can earn his due,
Go out and fight and you'll get it yet,
For it isn't your trade—it's YOU.

AS long as the prospects live and breathe
And have even a copper cent
There's trade for the man who will seek it out.
A blow always make sa dent.
Just cock up your chin and forget the gloom
Though things all around seem blue;
If you think you can get it you always can,
For it isn't your trade—it's YOU.

Have You a Slogan?

Many dealers, garagemen and repairmen have acquired an individuality for themselves and their community by the use of a distinctive slogan. For example the McMinn Tire Co. in Bridgeport, Conn., uses the phrase "Sudden, Smiling Service."

Morris Adler, Quincy, Ill., says, "Service With a Smile." "Potato Baker" Stover down in Ohio coined the phrase "Everything Automobilic."

As a general rule it does not matter particularly what the slogan is, so long as it is something which sticks in the minds of the public and means something.

That Morning Hour

Theoretically the easiest thing for the employees of a company to do is to observe those little rules having to do with the regulations of the office. Yet, many automobile dealers state that the observation of these small rules is one of the most difficult things to secure among even their highest priced workers, particularly salesmen.

As one dealer said, he has salesmen that he pays $10,000 a year and they seemed to be able to do everything in the world except to get down at 9 o'clock in the morning.

There was once upon a time a man who, to combat certain little defects on the part of an employee, would call the employee to him and say: "I believe you had better find another position, and in order to assist you I will give you a letter of recommendation."

He would then present to his employee a letter telling what a wonderful asset the employee was, with the single exception that he had one little fault. The letter would then enlarge upon this little fault after which everybody lived happily ever after.

Getting Prospects to the Salesroom

When you want to get a prospect to the salesroom and are in doubt as to just how you can induce him to come to your place of business, you might try a plan followed by a dealer in a New England city.

Whenever he was particularly anxious to get a prospect into the atmosphere of the salesroom and into the closing room, he would make his call on the prospect in a model which was not the

model in which he knew the prospect was interested.

For example, if he was quite sure the man might buy a roadster, if he bought anything at all, the dealer would make the call on him in a touring car and give him a demonstration in a touring car. He would explain that he had difficulty in securing the roadster for the demonstration because of the great demand for it and that the major features of the car were the same in both models.

After demonstrating in the touring car the salesman would suggest that they drop down to the salesroom, where one of the roadster models was on the salesroom floor or else the salesman might give the excuse that the roadster would be at liberty by the time they had returned. This way the prospect was brought to the salesroom for closing purposes entirely unknown to himself. Similarly an interchange of demonstration models can be effected in open and enclosed cars.

SETTLE THE WAR!

When the war was on—and it isn't over yet—we all had—and still have —ideas on how it ought to be run. Some of them really WERE good. But we couldn't get any one to use them.

HERE'S YOUR CHANCE!

Well, here's one place where your idea WILL be used. Send to this department some of your good ideas on business and selling. Help your competitors. For the trouble of writing the idea—if acceptable—one dollar.

Thank you.

For Next Winter

A dealer in Minnesota has sold cars every winter, even when the snow was so deep cars could not possibly run. The farmers took them home on sleighs and put them in the barn.

The dealer's argument was that with a bit of room on the barn floor, and some times a shoveled space in the yard, the farmer could spend the winter becoming accustomed to the controls and would be well able to start out with the new car when spring came. It must have been a good idea because it worked.

Save it for next winter.

Think This Over

"What one man can do you can force yourself to do at least to a moderate degree."

One of the most successful men in the automobile business made that statement and it is surely something to think about. Scratch your head and see if he is right.

Does Your Necktie Match Your Shirt?

IN putting on a necktie, in putting up a window display, in painting an automobile, in trimming a room or doing any one of the great variety of things it often is necessary to match colors. Put one color against another and it gives a pleasing appearance; put another color against another and the effect is decidedly displeasing. Just why one does not always know. There are, however, certain combination of colors which go well together because of their harmony or their contrast.

A bit of information that is worth keeping with you is the following information concerning combination of colors:

TWO COLORS

Black and yellow
Black and red
Black and light blue
Black and green
Black and orange
Red and dark blue
Red and green
Red and yellow
Light yellow and dark blue
Blue and orange
Adding white gives 3 colors.

RED will harmonize with the other two primaries, yellow and blue; also with yellow and green; blue-yellow and violet blue; green-yellow and blue, green-yellow and violet-blue; yellow-green and violet-blue. Any of the pairs named will form a good combination with red, in their normal state, when reduced with white, modified with gray or darkened with black.

YELLOW will harmonize with a primaries, red and blue; also with purple-red and blue; orange-red and blue; orange-red and violet-blue; purple-red and green-blue; red-purple and sea-green. Any of the pairs named will form a good combination with yellow, in their normal state, reduced with white, modified with gray, or darkened with black.

BLUE will harmonize with the primaries, yellow and red; also with yellow and purple-red; yellow and orange-red; green-yellow and red; green-yellow and purple-red; green-yellow and orange-red. Any of the pairs named will form a good combination with blue, in normal state, reduced with white, modified with gray or darkened with black.

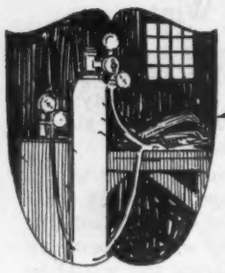
ORANGE will harmonize with the primaries, green and violet; also with green and purple-violet, blue-green and purple-violet; sea-green and purple-violet; sea-green and purple. Any of the pairs named will form a good combination with orange, in normal state, reduced with white, modified with gray or darkened with black.

THREE COLORS

Black, red and blue
Black, red and yellow
Black, yellow and blue
Black, red and green
Black, green and orange
Black, orange and blue

GREEN will harmonize with the primaries, violet or orange; also with violet and orange-red; blue-violet and orange-red; purple-violet and orange. Any of the pairs named will form a good combination with green in normal state, reduced with white, modified with gray, or darkened with black.

PURPLE will harmonize with orange and blue-green; orange and sea-green, yellow-orange and sea-green; orange-yellow and sea green. Any of the pairs named will form a good combination with purple, in normal state, reduced with white, modified with gray, or darkened with black.



Autogenous Welding

What it is and how it is applied

THIS is the sixth of a series of articles on autogenoous welding and describes the chemistry of the welding flame. These articles are intended to be of aid to the man who must learn the art of welding with little or no personal instruction. They also are intended as a reference for the man attending a welding school. It is likely that during the first few months of his instruction many problems will come up that may be solved more readily with these articles on hand.

Finally, this series should be of benefit to any automotive service man or repairman, even though he never intends to have a welding torch in the shop. The reading of these articles will give him an understanding of the subject which should greatly aid him in general repair work. He will be better able to decide, when he has a part to repair, whether it is feasible or not to weld it, and if so, if it will pay. The more familiar one becomes with this art, the wider the scope of its application. The man who is versed in the art will find many clever applications that one who is less familiar with the subject would never dream of. An understanding of welding principles offers a new technique to the automotive repairman.

THE chemistry of the oxygen acetylene blowpipe flame, Fig. 14, is interesting, instructive and not difficult to understand. The reaction which takes place in the luminous cone is as follows:

$$C_2H_2 + O_2 = 2CO + H_2$$

In other words, one part acetylene plus one part of oxygen becomes two parts of carbon monoxide and one part of hydrogen. An enormous amount of heat is released during this change and that is what makes the luminous cone so hot—6300 deg. Fahrenheit.

The two gases thus obtained, hydrogen and carbon monoxide, are both highly inflammable and when they surge out from the luminous cone they combine (burn) with the oxygen of the air. It is this action or rather reaction which makes the bushy or non-luminous envelope. The chemical expression is:

$$2H_2 + O_2 = 2H_2O$$
$$2CO + O_2 = 2CO_2$$

This means every two parts of hydrogen produced by the luminous cone unites with one part of oxygen to form two parts of steam; and every two parts of carbon monoxide combines with one part of oxygen to form two parts of carbon dioxide.

The word **part** in every case means part by volume and not by weight.

Still more heat is released by the reaction represented by the bushy part of the flame although this heat is not so intense as that produced in the luminous cone.

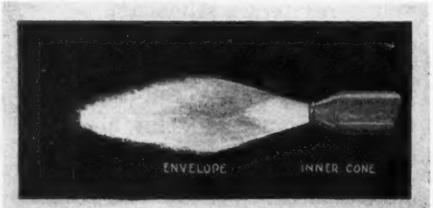
The non-luminous cone serves to heat the metal around the weld and the luminous cone does the melting.

What is known as a neutral flame is desirable for welding. It is one in which the mixture is neither too rich nor too lean, but just right; there is neither an excess of oxygen or of acetylene.

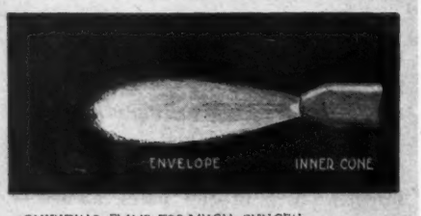
An excess of acetylene produces a carbonizing flame; such a flame has an excess of carbon and is yellow and dirty, and smoky. It is much the same type as that observed through an open pet cock of any automobile engine when the mixture is too rich.

Study of Torch Flame

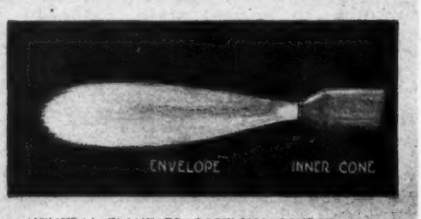
Such a flame is undesirable for many reasons. It is wasteful of acetylene. It lacks the high temperature of the neutral flame because some of the acetylene which passes through the luminous cone produces no heat and therefore any heat supplied to it is wasted. This flame smokes everything it comes into contact with. The carbonizing flame is also undesirable because it has a tendency to add carbon to hot metal, and this applies particularly to iron and steel. Additional carbon will increase the hardness and usually this is highly objectionable.



CARBONIZING FLAME TOO MUCH ACETYLENE



OXIDIZING FLAME TOO MUCH OXYGEN



NEUTRAL FLAME PROPORTIONS CORRECT

This flame, however, may be of service where additional hardness is desired.

The incandescent free carbon in this flame naturally has an affinity for oxygen and so might be used where the removal of oxygen from the metal was desirable.

An excess of oxygen, too lean a mixture, produces an oxidizing flame. This diminishes the size of the flame, blunts or blurs the incandescent cone and produces a weak, streaky or scattering flame. The oxidizing flame has neither the size nor the illuminating qualities of the reducing flame.

Such a flame, due to the excess of oxygen, is likely to ruin the work since it will burn the metal.

The burning of any substance may be roughly defined as the combination of oxygen with that substance at such a rate that considerable heat is produced. The burning of coal, for example, is merely the combination of the carbon and hydrogen, and other lesser constituents in its make-up, with oxygen. Likewise, the burning of iron is the combination of iron with the oxygen, to form iron oxide. Therefore, when the iron is burned by the use of an oxidizing flame some of the iron combines with oxygen to form iron oxide and this remains as an impurity in the weld.

The appearance of a neutral flame is characteristic. It is made up of a distinct and clearly defined incandescent pencil or cone of bluish-green color surrounded by a faint purplish-yellow secondary flame, or envelope of bushy appearance. The incandescent pencil or cone may be from ¼-in. to ⅝-in. in length and is usually rounded or tapered at the end. The maximum temperature of the oxy-acetylene flame is ⅛ to 3/16-in. beyond the extremity of this jet.

In establishing a neutral flame the jet should be of maximum size for the particular blowpipe head in use. This flame is established by gradually decreasing the acetylene supply until the point at which the incandescent jet is of the greatest clearness and is just passed.

Standard Mechanical Operations in Tractor Service

by John Charles Thorpe, M.E.
and Gustav Howard Radebaugh

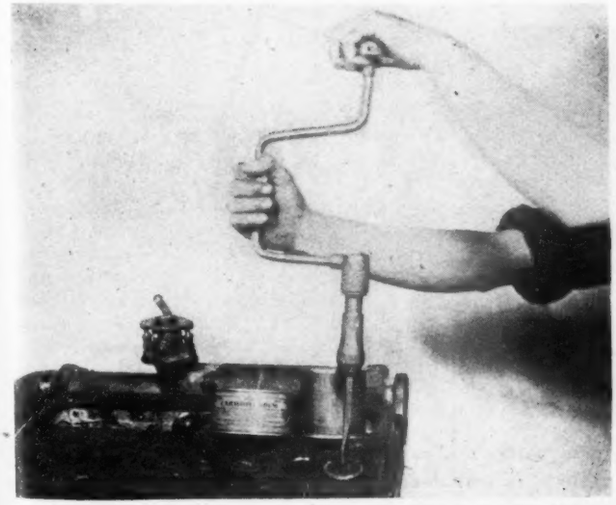
THE article herewith, while part of the series on Standard Mechanical Operations in Tractor Service, is, nevertheless, applicable to the entire field of automotive service work. Valve mechanism basically is not very much different in a tractor than motor car or truck engine, consequently what is said here applies in a large measure to any vertical cylinder internal combustion engine.

The valve mechanism of an engine is one of the prolific sources of trouble and nothing will throw an engine out of efficient running more quickly than improper functioning valves. Automotive dealers and repairmen will do well, therefore, to read and study carefully the article herewith and those that are to follow, so that mechanics might get the benefit of properly making valve repairs and adjustments.

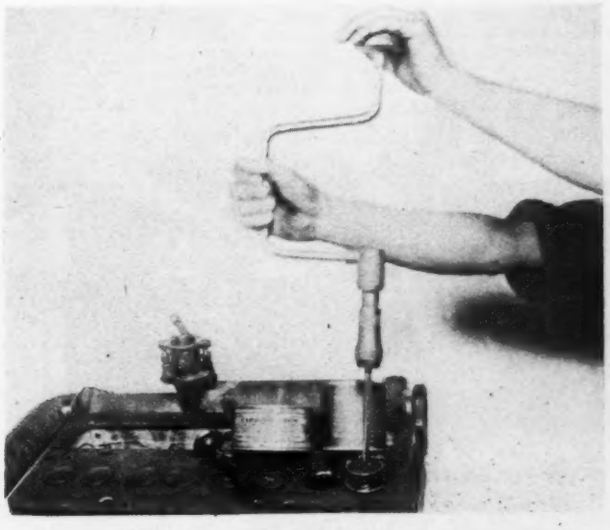
In studying this series of articles it is well to bear in mind that the authors have given much study to the question of motion and time. In other words, the operations have been worked out so that minimum effort and time is required to do the work. Often much time is wasted by mechanics doing unnecessary work on a job, which job if intelligently handled could be done in half the time.

Detail of Valve Grinding Process

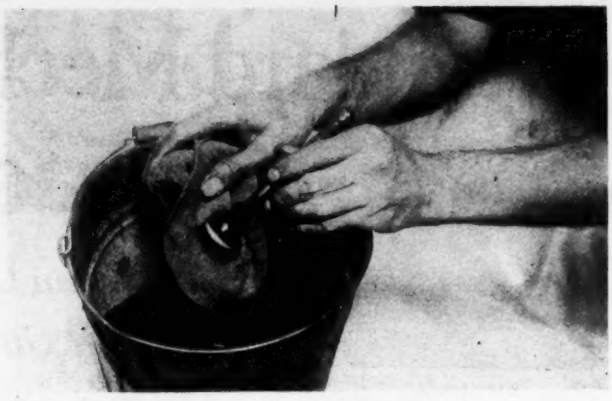
CONTINUED FROM LAST WEEK'S ISSUE ON THE CAUSE AND REMEDY FOR IRREGULAR FIRING AND LACK OF POWER



9. The valve may now be put in place. The tools necessary for regrinding consist of an ordinary carpenter's brace with a screw driver bit. A slot is made on the valve to receive the tool

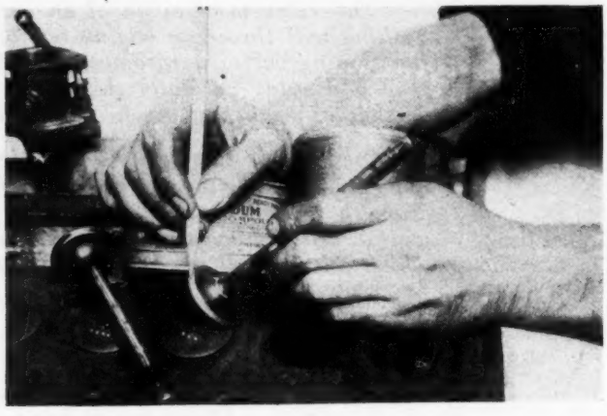


10. The grinding should be done with a firm pressure, with an oscillating motion, the valve allowed to raise from its seat as the motion in each direction is completed

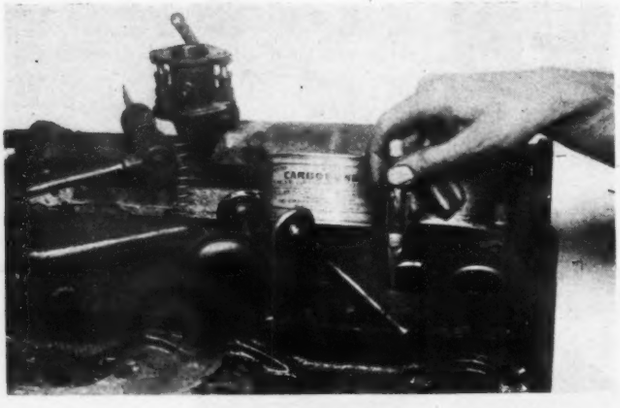


11-12. After the grinding has continued some little time, the valve should be removed for inspection and test. The compound should be wiped off and the valve washed thoroughly in gasoline. After it is wiped dry, the surface is ready for test. The seat should be cleaned in like manner

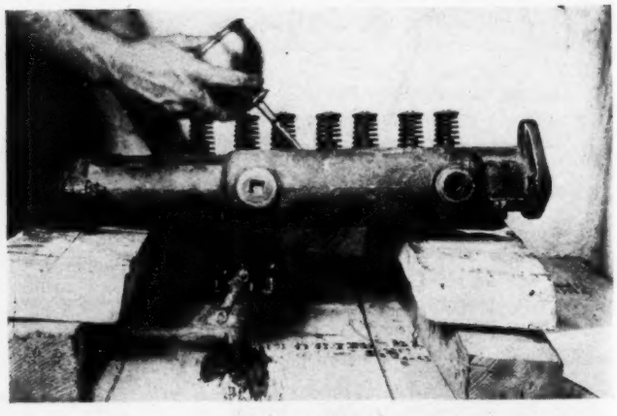
13. It is clear that there must be some conclusive test method beyond the ordinary visual inspection. Prussian Blue is wiped on the valve in an even thin layer. The valve is then put in place and rotated on its seat. An even, continuous bearing of the valve on the seat will be indicated by the bluish trace on the valve and seat



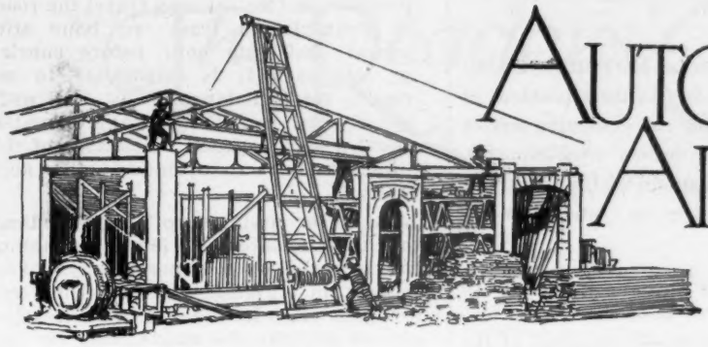
14. In lieu of Prussian Blue, a soft lead pencil may be used. The inspection should indicate the efficacy of the grinding. If the joint is good, a continuous trace of the pencil marking will be found around the valve and the seat



15. In some instances the wear of the valve on the seat will be such as to wear the edge very thin. This condition may be felt in the form of a "burr" as the finger is run around the seat. This "burr" may be removed with a round file, or the heavy blade of a pocket knife



16. After the valve is re-assembled, or, if for any reason it may be deemed advisable to "touch up" other valves while the head is off and the material and tools are not at hand, a very simple test may be made as follows: Place the head right side up on the blocks and squirt a liberal amount of kerosene over them



AUTOMOTIVE ARCHITECTURE

Planning and Building Problems

CONDUCTED BY TOM WILDER

No. 260

GENERAL SERVICE STATION FOR ENGLISH FIRM

Q—We are about to erect a garage and service station somewhat on the plan of the sketch inclosed herewith and will thank you for any suggestions. The building will be ground floor only, with the exception of the two frontages on which an additional story will be built to a depth of 30 feet.

It is impossible to state at present the relative sizes of the different departments such as the show-room, garage, repair shop, etc., but the plan should allow, if possible, for the expansion of one at the expense of the others. Twenty men will be employed in the repair shop; the show-room should have space for from 6 to 8 cars while the garage must have space for 20 cars. A fairly large accessory department will also be required.

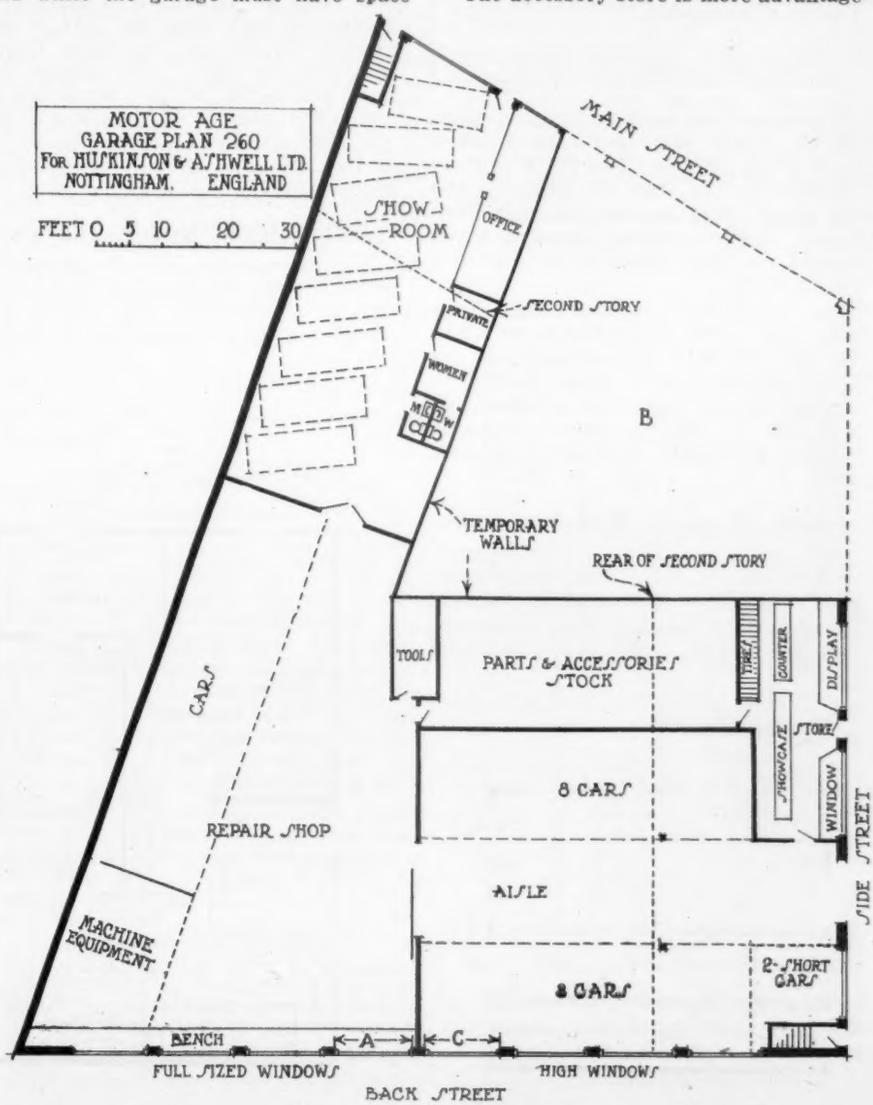
At present service will be confined mainly to touring cars but we may handle trucks later on. The remaining portion of the land marked B will also be available in the near future if required for expansion.—Huskinson & Ashwell, Ltd., Nottingham, England.

On account of your narrow frontage on the main street, it is necessary to choose between the accessory store and show room for the advantage of the front location. The space is too narrow for both and also too narrow to allow a car entrance from this side of the street.

The accessory store is more advantageously placed at the side of the car entrance, consequently we have moved these two to the side street and left the show-room in sole possession of the Main street side. When you are ready to occupy B, a better arrangement can be made. The show-room can be placed across the front with a car entrance on that side if desired, while the accessory store can be moved forward with the office between it and the show-room.

There is not much chance of flexibility as long as you have your departments partitioned off. Of course, one can store cars in the shop when there is room and also do repair jobs on cars in the garage. Perhaps, by the time you make your expansion, you will know more about the relative proportions the departments should be.

We have shown no entrance from the back street, as it is not best to have too many entrances and exists. However, it might be better to make an exit at A or C in order to avoid congestion in the garage.



No. 261

A SMALL WASHING PLANT

Q—I am planning to erect a washing station for the purpose of washing, polishing and greasing cars. The plant will be located on a lot which is 50 by 60 ft. in size. The building is to be one story with space for about 8 cars. There will be a small office and the rest of the floor space will be used as a wash rack. Also, I would like some suggestions concerning equipment for washing the cars that will prove as time savers in the work.—J. H. Free, Saskatoon, Sask., Canada.

If you intend building a frame structure for this washing station, we would suggest making the foundation of brick or concrete and building it up two or three feet above the floor level, as the constantly soaked condition will cause the sills and stud ends to quickly rot away if they are not kept up out of the water.

Our layout shows two runways, eleven feet wide, inclosed by low concrete or brick walls, A and B. These walls should be three feet high or at least high enough to keep the water from splashing outside.

If practical, it would be well to give the floor a pitch from front to rear just enough to make it easy to push the cars forward by hand as the washing progresses.

Your space is rather small for operating a plant of this kind and since you have no room for storage it will almost be necessary to have a shed or large

space conveniently located in which to store cars until they are called for. Such plants have quite a lot of the "washed while you wait" trade, but when patrons want to leave their cars and stop for them on the way home, you must have a place to keep them. A vacant lot would do but a rain is liable to undo the washing before the customer comes.

About the only equipment on the market for washing cars are the brushes and sponges with hose connections sold by supply dealers. For an arrangement of this kind you must design your own equipment.

No. 262

A COMPACT TIRE, BATTERY AND ELECTRIC SERVICE STATION

Q—We are distributors of the U. S. and Goodyear tires as well as Willard storage batteries and have a complete battery repair and vulcanizing shop arranged as shown in the plan we are enclosing.

At present we are operating the tire and battery departments and what electrical work there is to be done on cars and will continue with these lines during the summer. During the coming winter, however, we are going to remodel our building so we will have more efficient battery and tire department and also a complete starting, lighting and ignition repair department and a stock of parts for same.

We want the display room to look as attractive as possible, yet owing to limited space we must also use it for stock or repairing. There will be one man in each department. The battery charging line will have fifteen batteries maximum.

As we are a new concern we would appreciate any ideas or suggestions you have to offer on the arrangement of our shop, methods of conducting business, etc.—Automotive Electric Service Co., New Rockford, N. D.

Your great trouble is going to be lack of space and rather than spend a lot of money remodeling this shop it would be better to move to larger quarters; or, if you own this place, build on another story. We have seen tire shops that did not appear to be doing excessive business that were larger than your whole shop. Of course, you can eliminate a lot of unnecessary things to gain space but it is harder to work in crowded quarters than it is in a place that is too large. One gets in his own way; one job must be absolutely cleaned up and out of the way before another is started and often this is inconvenient or impossible.

If the "store room for one car" you show on your diagram can be turned into the shop and the several junk cabinets turned into something useful, you may get along for some time. Junk should not be allowed to accumulate; parts that still have some usefulness should be cleaned up and stored properly where they can be found when wanted, and those which have no more value should be disposed of as junk.

Your air tank may be suspended from the ceiling and the compressor installed on a shelf to save space. Also eliminate the Standard Oil Company's desk; the oil business has nothing for you unless in his rounds this agent can speak a good word for you. The space is more valuable to you than his presence and we believe that it cheapens your business to house outsiders; looks as if you needed the rent money he pays to help you get along.

In our layout the stenographer can take care of the office, watch the store, keep the company accounts, and call out the necessary expert when needed to clinch a sale or settle an argument. It will also be hard for idlers to get in behind the counter and interfere with work.

In this department MOTOR AGE aims to assist its readers in their problem of planning, building and equipping service stations, garages, dealers' establishments, shops, filling stations and in fact any buildings necessary to automotive activity.

When making requests for assistance please see that we have all the data necessary to an intelligent handling of the job. Among other things we need such information as follows:

Rough pencil sketch showing size and shape of plot and its relation to streets and alleys.

What departments are to be operated and how large it is expected they will be.

Number of cars on the sales floor.

Number of cars it is expected to garage.

Number of men employed in reptair shop.

And how much of an accessory department is anticipated.

URGES SPARE GLOBES FOR CARS

Harrisburg, Pa., Aug. 5—"Just as automobiles carry spare tires and tubes," says Registrar B. G. Eynon, "they should carry spare globes for their headlamps and rear lights. The law specifically provides that no car may travel the roads of Pennsylvania from one hour after sunset until one hour before sunrise, or whenever it is impossible to see clearly for a distance of 200 feet, without at least two lights of approximately equal power, in front. Violations of this provision have cased innumerable accidents."

He calls attention to reports indicating that numerous accidents are taking place in the state because many drivers persist in traveling at night with only one headlamp burning. Often other motorists mistake the single lamp for that of a motorcycle and fail to give a wide enough berth to prevent an accident.

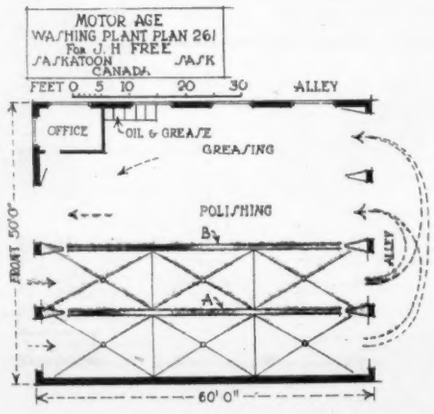
TRUCKS IN SOUTH

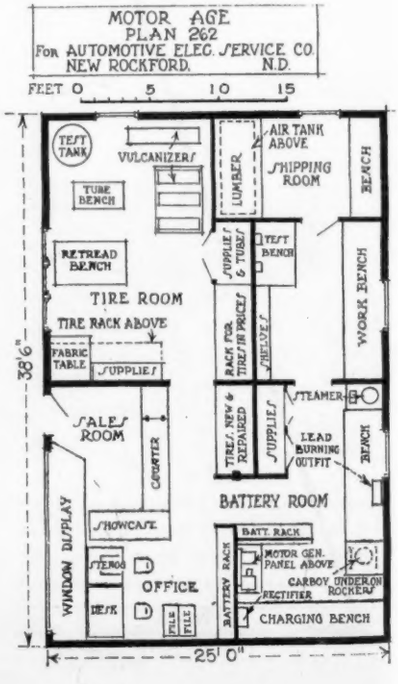
NEW ORLEANS, LA., Aug. 2—A law which provides for the registration of automobiles, much after the manner of the registration of real estate, and calculated to put a curb on the steadily increasing number of automobile thefts, has been passed by the Louisiana State Legislature, and becomes effective Sept. 1.

The new law provides that all sales or transfers of automobiles shall be evidenced by an authentic act recorded in the parish in which the sale is made; that every act of sale or transfer of an automobile shall state the year of manufacture of the car, the price thereof, the style and model, the number, size, make and power of the engine, and the name and address of the person from whom the seller acquired the car, as well as the place and time of record of the seller's title.

MENOMINEE MOTORS MOVES

Menominee, Mich., Aug. 13—Menominee Motor Truck Company is moving its factory to Clintonville, Wis., where it is expected to be in production in September.





The Readers' Clearing House

Questions and Answers

CONDUCTED BY ROY E. BERG
Technical Editor, Motor Age

THIS Department is conducted to assist Dealers, Service Stations Garagemen and their Mechanics in the solution of their repair and service problems.

In addressing this department readers are requested to give the firm name and address. Also state whether a permanent file of MOTOR AGE is kept, for many times inquiries of an identical nature have been asked by some one else and these are answered by reference to previous issues.

MOTOR AGE reserves the right to answer the query by personal letter or through these columns.

VULCAN GEARSHIFT

Q—Explain and illustrate the electrical Vulcan gearshift as used on the 1915 Pullman.—Bob Squires, Salt Lake, Utah.

The Vulcan gearshift is a system employed to shift the gears by magnetic means. The current is taken from the storage battery and by the selective switches on the steering column may be made to flow through any one of the four solonoid coils, three of which are for the forward drive and the fourth for reverse. The method of operation for this gearshift is very simple requiring only that the button corresponding to the desired gear be pushed and the clutch pedal depressed. Two switches are employed between the battery and the coils. One is a knife switch which is controlled by the clutch pedal, the other is the dash button on the steering wheel. The heavy current necessary to operate the gears flows through the knife switch operated by the clutch and the dash buttons on the steering wheel merely selects the circuit for the particular speed desired. The illustration in Fig. 1 shows the diagram of the connections from the steering column to the master switch to the coils and to the battery. The current flows from the battery through the solonoid coil and pulls the magnetic plunger with a force anywhere up to 100 lbs. depending on the condition of the battery. This energy is transmitted through the lever arm to the gear shifting fork exactly as if the gears were controlled by a hand-operated lever. Fig. 2 shows a simplified diagram of the method of operation and Fig. 3 shows the element with the cover removed.

STARTING MOTOR TROUBLE

Q—The Gray and Davis starter on a 1916 Paige model 6-46 is very slow in turning over the engine. I have changed the armature and bearing and also the brushes. Have also tried a new full charged battery and it acts the same.—K. Moosa, K. Moosa Garage, Eunice, La.

In the first place go over the connections carefully and be sure that the battery cables are in firm contact with the battery terminals and starting motor. Examine the starting switch to see that it is making good contact when the starting pedal is pressed to its full limit. Press the blades outward slightly if good contact is not made. After these tests have been made it would be advisable to test the entire starting circuit for grounds or shorts.

GENERATOR TROUBLE

Q—A new battery in a 1918 Maxwell equipped with a Simms Hoff generator starter must be recharged every few days. The belt that drives the starter-generator is in good condition and kept tight all the time. The generator starter is in good condition and it shows "Charge" on the switchboard whenever the engine runs. All connections and wires seem to be good. What is the cause of the battery becoming discharged on this car and what would be the proper way to remedy the trouble?

2—Would the installation of a circuit breaker on this car be practical and would it remedy the trouble. If so, where could one be obtained?—Henry Rohrer, Rock Elm, Wis.

1—It must be that the charging rate of the generator is low. It is advisable to connect an ammeter in the circuit and see just what the charging rate is. The generator ought to charge at the rate of about 14 amperes when the car is traveling at a speed of about 20 to 22 miles per hour. If you find that the charging rate is alright go over the connection carefully to see that there are no loose ones. Trace out the circuits to see if there is a ground. The adjustment of the charging rate of the generator was fully explained in the July 29 issue of MOTOR AGE.

2—We do not see what function the circuit breaker will perform. If the system is properly adjusted and the wiring is in good condition there is no reason why the battery should not keep up to charge.

The Electric System

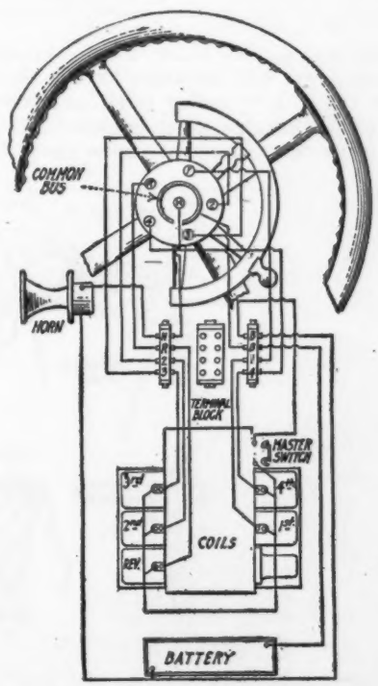


Fig. 1—Shows the connections in the Vulcan electric gearshift from the steering column to the master switch to the coils and the battery

INSTALLING AMMETER

Q—Show how to install a Roller Smith 20 ampere ammeter on a 1915 Dodge.—George Dittiacur, Hammondspoint, N. Y.

If the P. V. Universal model of ammeter is used it can be connected in place of the current indicator now installed on your car.

BATTERY DISCHARGES

Q—What causes the battery to discharge back through the northeast starter generator model on a Dodge 1916 car. The battery cannot be kept charged. It discharges continually when the generator leads are connected up.—George Kraus, Mogollon, N. M.

The most probable cause of a battery discharging through the starter-generator on the 1916 Dodge Brothers car is a burned out or damaged reverse current cutout. On this model the reverse current cutout is mounted inside the starter-generator which must be removed in case of repairs or replacements. It is possible that the trouble might be due to a short circuit or ground elsewhere in the starter-generator. It is, of course, assumed that the car wiring has been inspected to make sure that an accidental ground in the wiring is not responsible for the trouble.

SPLITDORF MAGNETO

Q—Publish diagram of the Splitdorf dual magneto system as employed on the 1913 Buick.—G. H. Snyder, Baltimore, Md.

The Splitdorf magneto as used on the 1913 Buick is shown in Fig. 4.

DOUBLE IGNITION

Q—Desire to install a double ignition system on a Premier model 6-50. This car is equipped with the Herschell Spillman engine and at present with the Remy ignition, coil and generator. There is a bracket and timing gear shaft on the op-

posite side of this engine where we wish to install a Bosch high tension magneto. However, the only place we can see to install the extra set of spark plugs is in the port plugs directly over the exhaust valves. Would this be advisable or would it give any added power if we run the wires from the magneto to the present spark plugs. We would prefer drilling the exhaust port plugs for the extra set of spark plugs if in your estimation it would work satisfactorily. This car has a speedster body and is geared 3 to 1. It has always been hard to start. Would this tend to remedy the trouble?—C. K. Switzer, Kavanaugh Garage, Harrisonburg, Va.

If there is enough room to install the spark plugs above the exhaust ports it will give satisfactory operation. The advantages that are gained in the use of double ignition are that you get more power, better combustion, and better reliability. With the use of this system the spark will occur in different parts of the cylinder and the result is more complete combustion. This would tend to make starting easier but we are inclined to believe that the starting trouble is more apt to be carburetion than ignition.

OAKLAND WIRING

Q—Publish wiring diagram of the Oakland 36.—W. Remstedt, The Just Rite Auto Repair Shop, Sacramento, Calif.

The Delco system used on the 1914 Oakland 36 is shown in Fig. 3.

HUPMOBILE AMMETER INSTALLATION

Q—Can a relay be put on a Hupmobile Model K which is equipped with a Westinghouse starter and generator combined?
2—Explain how to wire the ammeter.—A. L. Payne, Repair Shop, Port Arthur, Tex.

1—This system is already equipped with a relay and cutout regulating device and since we do not know what you wish to do when you state that you wish to install a relay it is impossible to state whether it will be applicable to this system or not.

2—Fig. 9 shows the connections to be made when installing an ammeter. Note the ammeter will indicate discharge only.

Miscellaneous

AXLE LEAKS OIL

Q—Instruct how to prevent the oil from leaking from the rear axle of a ¾-ton Clydesdale truck. Some oil has been drained out but it still throws oil on the rear wheels and on the brake.—J. Ebulin, Fort Smith, Ark.

The oil level should be kept below the shaft. Evidently there has been too much oil and although some may have been drained off you evidently did not drain off sufficient. It is also very possible that the tubing has had more or less oil in it caused from the shaft having an oversupply.

1911 NATIONAL

Q—What is the horsepower of the 1911 National 40?
2—How many revolutions will it make to the minute?
3—How high could this be geared and how much speed could it be made to do?

TO assist readers in obtaining as a unit all information on a certain subject MOTOR AGE segregates inquiries in this department into divisions of allied nature. Questions pertaining to engines are answered under that head and so on.

The Electric System

Bob Squires.....**Salt Lake City, Utah**
K. Moosa, K. Moosa Garage.....**Eunice, La.**
Henry Rohrer.....**Rock Elm, Wis.**
George Ditiacur.....**Hammondspoint, N. Y.**
George Kraus.....**Mogollon, N. M.**
C. K. Switzer, Kavanaugh Garage.....**Harrisonburg, Va.**
W. Remstedt, Just Rite Auto Repair Shop.....**Sacramento, Calif.**
A. L. Payne, Repair Shop.....**Port Arthur, Tex.**

Miscellaneous

J. Ebulin.....**Fort Smith, Ark.**
J. W. Tardy.....**Douglas, Ariz.**
L. M. Seneden.....**Indianapolis, Ind.**
E. M. Thom.....**New York City**

Carburetion

L. H. Raines.....**Kansas City, Mo.**
M. L. Johnson.....**Hibbing, Minn.**
George A. Webster.....**Glen Falls, N. Y.**
George Dittiacur Hammondspoint, N. Y.

Engines

Motor In.....**Finlayson, Minn.**
A. L. Shamley.....**Rock Island, Ill.**
Walter Glover.....**San Benito, Tex.**
Thomas Berry.....**Belmar, N. J.**
Wm. Niemeyer.....**East Moline, Ill.**
Carl Ashworth.....**Chattanooga, Tenn.**

4—What size wheel is most used in cars where speed is desired above all else?
5—Publish instructions to install speedometer so that it will register correctly?—J. W. Tardy, Douglas, Ariz.

1—We do not know what maximum horsepower was developed by this engine but the N. A. C. rating is 40 horsepower.

2—We have no exact information concerning the maximum engine speed but it developed its maximum horsepower at about 1650 r.p.m.

3—The standard gear ratio of the touring car was 3 to 1 and the roadster 2.5 to 1. We believe that the gear ratio should be left as it is. The racing car which Joe Dawson drove at Indianapolis in 1912 was geared 2.21 to 1 and his average speed was about 78 miles per hour for the 500 miles. This car should be able to make better than 70 miles per hour as it is without any changes.

4—The question of wheel size is determined according to engine speed and gear ratio and as a matter of fact every detail of the chassis construction is taken into consideration.

5—If you use a Stewart Warner speedometer the drive gear or gear that is attached to the front wheel should have 72 teeth if the wheel is 36 inches in diameter. This should give a correct reading but of course we cannot vouch for the accuracy of the instrument itself.

CHALMERS CHASSIS

Q—Publish view of chassis of the Chalmers car.—L. M. Seneder, Indianapolis, Ind.

See Fig. 7.

SPICER UNIVERSAL

Q—Explain and illustrate the construction and operation of the Spicer universal.
2—How many cars and trucks use this terminal?
3—Is it only used on the propeller shaft and in the case of the propeller shaft what happens where the rear springs flatten or compress?—E. M. Thom, New York City.

1—Figs. 6 and 8 illustrate the Spicer universal joint. The angularity of the drive is taken on the cross and the manner in which this member is connected to the driving plate of the universal can be seen from the exploded view.

2—About one hundred thirty manufacturers use the Spicer universal.

3—The action of the springs is compensated by the telescoping spline fitting in the forward joint in Fig. 8.

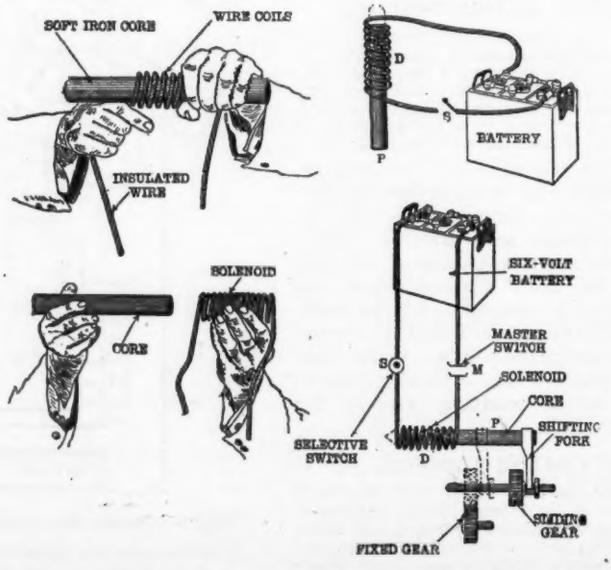


Fig. 2—A simplified diagram of the method of operation, of the Vulcan electric gearshift

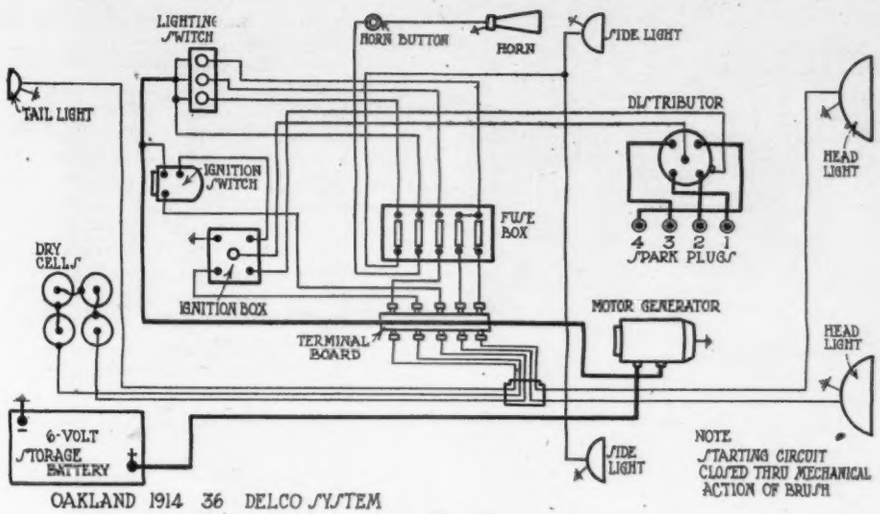


Fig. 3

Carburetion

EFFECT OF LIVE STEAM

Q—What is the maximum horsepower developed by the 1916 Cadillac 53?

2—What is the weight of the 7-passenger Cadillac ready for the road?

3—What is the maximum speed this Cadillac will give under the best conditions?

4—What is considered good gasoline mileage for a Cadillac?

5—Did the first Cadillac eights have removable cylinder heads?

6—Is there any advantage gained by installing a device that injects live steam in an engine?—L. H. Raines, Kansas City, Mo.

1—We have no exact information concerning the power developed but it was somewhere in the neighborhood of 80 horsepower.

2—There are no weight figures available but we should estimate that it would be considered more than 4000 lbs.

3—This is a question that cannot be answered definitely, but the car ought to make about 60 to 65 miles per hour under average conditions.

4—We have never seen any figures about the gasoline consumption of the Cadillac, but we have heard of cases where the owner got approximately 12 miles per gallon under city driving conditions.

5—The first Cadillacs were not provided with removable cylinder heads.

6—The question as to what is accomplished by the injection of live steam into the manifold has been given a great deal of thought and many experiments have been conducted. The Bureau of Standards at Washington, D. C., conducted a long series of tests extending over a period of several months and later issued a report to the effect that the steam accomplished absolutely nothing. However, devices which are now on the market that make use of live steam have shown by actual test that the gasoline mileage is increased and that it has some effect on the carbon.

STROMBERG ADJUSTMENT

Q—In a Paige 6-42 equipped with a Rayfield carbureter, upon opening the throttle quickly it seems to kill the engine unless the car is moving very rapidly? It is cut down fine but cannot get it to spit or flutter upon opening quickly?—M. L. Johnson, Hibbing, Minn.

If this car is equipped with a Rayfield carbureter it has been a replacement for our records show that this model is equipped with a Stromberg carbureter. We will give the adjustment for both the Stromberg and the Rayfield. There are two adjustments on the Model MB-1 Stromberg carbureter; A, Fig. 11, is the main adjustment which controls the gasoline supply from the float chamber, regulates the mixture throughout the whole driving range and which should be set in the position where best power and pick up are obtained. The needle is raised and the supply of gasoline thereby increased by turning the nut A in an anti-clockwise direction or to the left. Turned clockwise or to the right, the needle is lowered and the supply decreased. We advise making an entirely new carbureter setting. Turn nut A to the right until the needle is just seated; it should then be turned to the left three complete turns. This setting will give a rich mixture which can be cut down after the engine is allowed to run a short while and warmed up. When the engine is idling, gasoline is taken in above the throttle and controlled by dilution with the air from the outside of the carbureter, as regulated by screw B, which should be set at between ½ and 1½ turns to the left from the seating position. When the engine is warmed up the supply of gasoline may be increased or decreased by turning the screw in a clockwise or anti-clockwise direction as found necessary. This idle adjustment is effective only when the throttle is nearly closed. The season adjustment shutter on the carbureter where the hot air pipe is attached, should be closed during the winter months and during warm weather should be opened to admit cool air. The Rayfield which you have on the car is probably the Model M. From your description of what happens we believe the carburetor is out of adjustment. Full details for the adjustment of the Rayfield carbureter was published in the May 13 issue of MOTOR AGE on page 15.

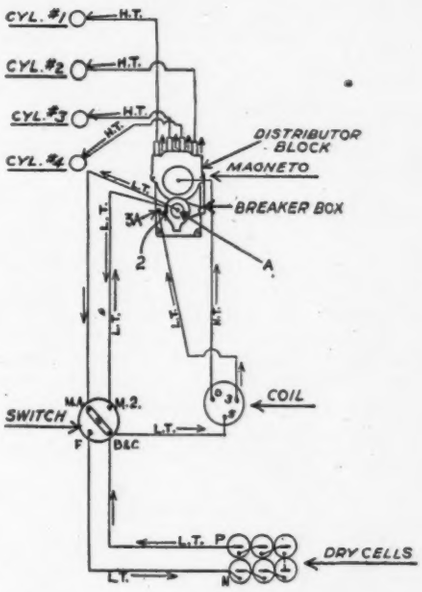


Fig. 4—Splitdorf magneto as used on the 1913 Buick

MAXWELL CARBURETER ADJUSTMENT

Q—Can adjustments be made for the Schebler carbureter used as standard equipment on the 1915 Maxwell, to get better results from the present day gasoline?—George A. Webster, Glens Falls, N. Y.

MOTOR AGE specifications state that the Kingston carbureter was standard equip-

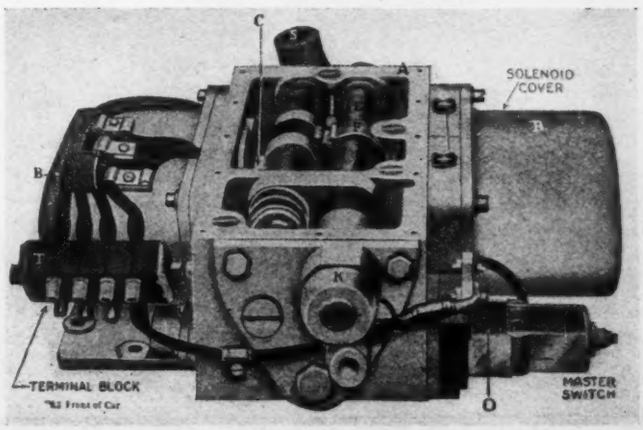


Fig.5—Vulcan electric gearshift unit with cover plate removed

ment on the Maxwell and this fact was verified by the Maxwell company. Therefore we show in Fig. 10 a view of the Kingston carbureter employed on the 1915 Maxwell and its adjustment is as follows:

First it is necessary that the compression be good and equal in all cylinders. The ignition must be right and air leaks between the manifold and carbureter or cylinders must not exist. Then close the needle valve of the carbureter turning it to the right. When it closes be sure not to force the valve further. The needle will seat with a gentle motion. After the valve has been closed it should be turned to the left one and one-half turns. This is slightly more than is required for normal running but an easy start will be assured for the mixture will be rich. Now the engine should be started and run until heated to running temperature and the needle valve should then be closed to the right a little at a time opening the throttle until the point is reached where the engine just starts to spit back through the carbureter.

CARBURETER TROUBLE

Q—A 1915 Dodge has had the valves ground in, new gaskets in head and carbureter connections but it will not run steadily until well warmed up. It works O.K. in low but in second and high it jumps like a jack-rabbit until the choker is pulled out then steady for a moment and commences to slow up. After a minute it commences to buck again. It keeps this up until the engine becomes warm and then it works fine.—George Dittiacur, Hammondsport, N. Y.

The fact the engine will run alright for a few minutes with the choker out leads us to believe that the carbureter or gasoline feed lines are causing the trouble. The mixture is probably too weak and when the carbureter choker is pulled out the mixture is naturally richer and the engine will run alright until the engine begins to choke up due to too rich a mixture. Go over the feed pipes carefully and see if all of the connections are tight and the pipes are clear. Then make a careful adjustment of the carbureter. It is quite possible that the valves are not seating properly and also that the gasket may be leaking. To inspect the pressure line, obtain a normal pressure in the gasoline tank by means of the hand pressure pump and place a few drops of solution of soap and water on each of the joints. Air bubbles appearing at any of the points will indicate the leak. If the cause is not located after this test, inspect the pressure. Before making any adjustment of the carbureter it should be thoroughly cleaned as in many cases this will remedy the trouble. To drain the carbureter, release the air pressure by unscrewing the gasoline filler cap, disconnect the gasoline feed pipe at the carbureter, unscrew needle valve cover on the top of the float chamber and lift the needle valve off the seat. This allows the draining of the carbureter and flushing out of any water, dirt or sediment which may be lodged in the float chamber. Fig. 10 shows a cross section of the carbureter used on this model. Dirt may also have accumulated in the ball check valve in the gasoline passage. This can be cleaned out by removing studs which hold the metering pin carrier and rack.

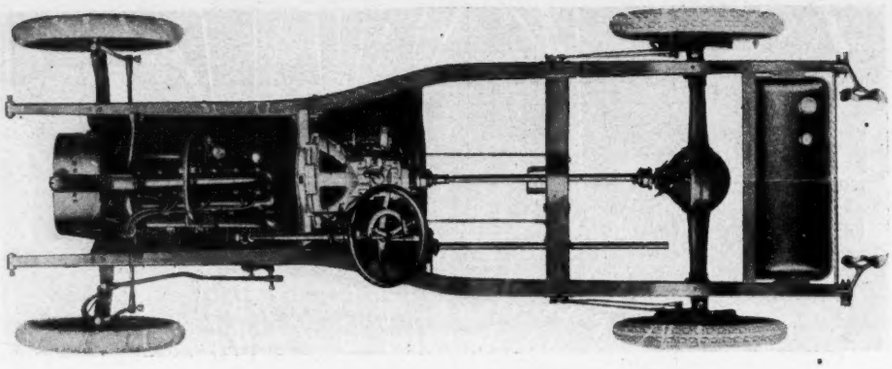


Fig. 7—Airplane view of the Chalmers chassis

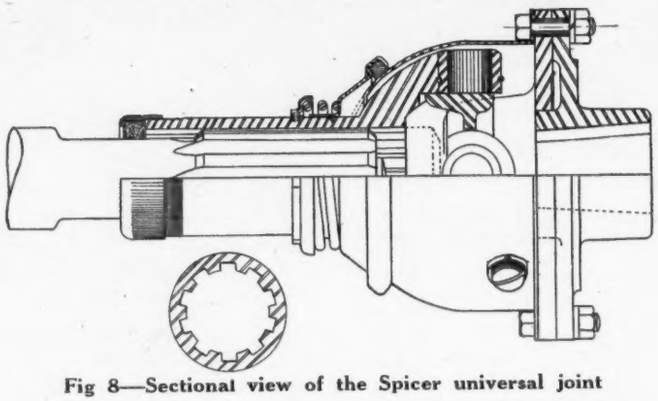


Fig 8—Sectional view of the Spicer universal joint

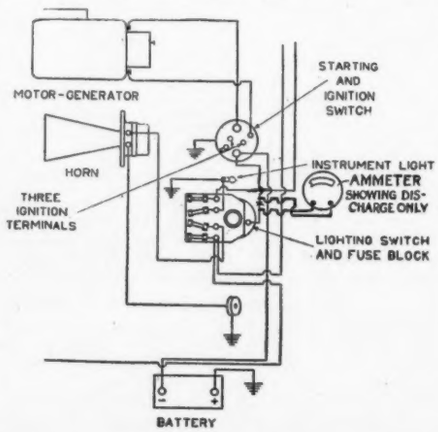


Fig. 9—Ammeter installation on the Hupmobile model K

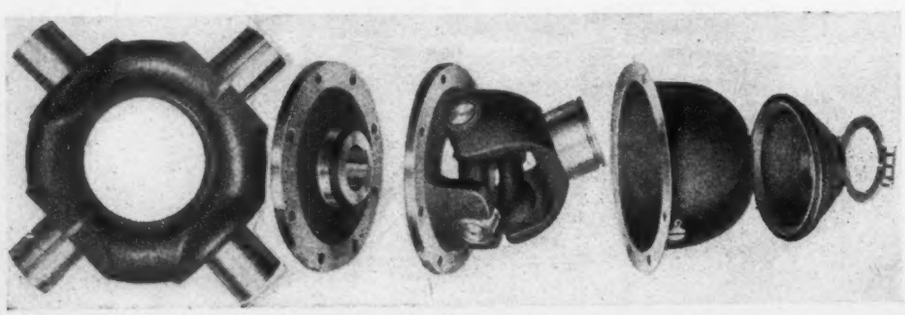


Fig. 6—Dissembled view of the Spicer universal

Engines

ENGINE ACTS SLUGGISH

Q—Would it be advisable to put a Model 88-4 Willys Overland Knight engine in an E. M. F. 30 car? What would be the necessary changes that would have to be made to make this engine fit?

2—What will make an engine drag or in other words seem lazy? It was rebored and the manifold sweats drops of water. At first it runs perfectly and has lots of power then water will form on the manifold and it will lose its power.—Motor Inn, Finlayson, Minn.

1—We do not think it advisable to install the Knight engine in this chassis because it would not be worth the trouble and expense. There is very little information available on this model because it is so old. Since we have no detailed drawings it is impossible to state whether the installation could be made or not. Considering the cost of the Knight engine and the necessary parts to make the installation as well as the labor cost it would be much more profitable to buy a new car.

2—This sluggish action of the engine is probably due to carburetion or lack of compression. If the manifold is long

there is bound to be a great deal of condensation. With the use of present-day fuel because of the high end points of the gasoline it is a very difficult matter to properly vaporize the gasoline.. The tendency at the present time is to use a type of hot-spot manifold. Reports of the Society of Automotive Engineers show that the hot-spot is one of the successful methods of handling present fuels. A long manifold which will give plenty of cooling surface will naturally create a lot of condensation which will cause the engine to choke up and give very poor acceleration. Without more details it is impossible to give you any of the causes or remedies. The fact that you have rebored the block and refitted new pistons creates a possibility that the fitting has not been done correctly and loss of compression is the result.

CRANKSHAFT END PLAY

Q—Instruct how to take up end play on a crankshaft of a Cole 8 model 850 1916.—A. L. Shamley, Rock Island, Ill.

End play in this case is probably due to worn bearing caps. In some cases it can be taken up by the fitting of new bearings while in others it requires new caps. We advise removing the oil pan from the bottom of the engine, taking care not to break the cork gasket between this pan and the bottom of the crankcase and make a careful examination of the bearing caps. If they appear to be worn we advise replacement.

ENGINE FOR STATIONARY WORK

Q—Desire to rig up a stationary power plant from the Chevrolet 4-cylinder engine. How much horsepower can we depend upon being derived from a pulley on the engine?

2—What size pulley is best and how should it be attached?

3—Should a governor be installed and where

4—Would you advise running it direct or through a shaft? The only machinery we wish to operate is a large feed grinder?

5—Give plan for mounting the engine, giving details you may think are necessary.—Walter Glover, San Benito, Tex.

1—We are assuming that you do not need over 12 or 14 horsepower and our selection of the pully size has been made accordingly. This engine develops about 21 horsepower at a speed of about 1400 r.p.m. The amount of power it is possible to get from the pully is dependent upon the size of the pully and the belt and belt speed.

2—The two pulleys to be used should be 16 by 5 on the feed grinder and 8 by 5 on the drive shaft. Fig. 10 shows the proper way to run a power plant of this kind. The principle dimensions are given. We are assuming that you intend to use the clutch and transmission unit.

3—If connected as shown a governor will not be necessary.

4—We believe that the proper way to drive this grinder is by belt from a shaft which will have to be connected through a universal joint and bearings provided as shown in the illustration. The shaft ought to be 2 in. in diameter.

5—See Fig. 10.

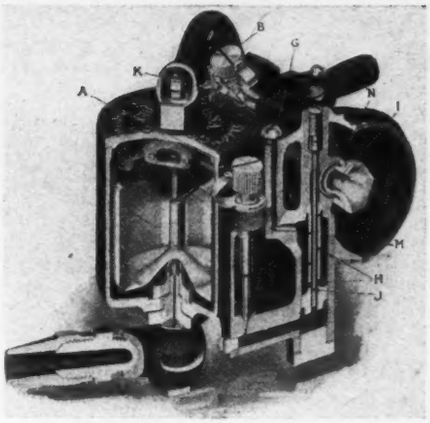


Fig. 11—Stromberg model MB-1 carbureter used on the Paige 6-41

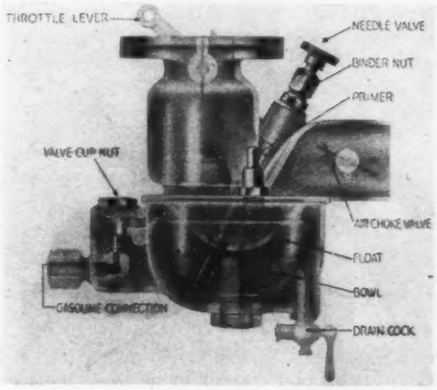


Fig. 12—Schebler carbureter used on the 1915 Maxwell

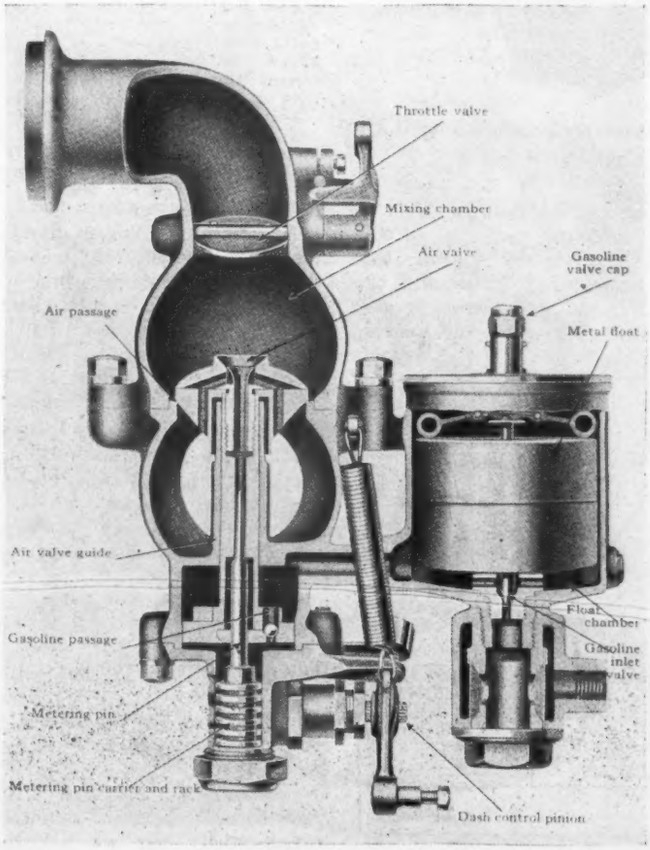


Fig. 10—Kingston carbureter employed on the 1915 Dodge

VALVE GRINDING

Q—Instruct how to grind the valves in a 1918 Continental 9N engine. This engine has no removable head.—Thomas Berry, Belmar, N. J.

Refer to Fig. 15. In order to get at the valve springs it will be necessary to remove the plate on the side by simply removing the wing nut. To gain access to the valve you will have to remove the cylinder plug above the valve into which the petcock is screwed. The first thing to do is to compress the valve springs so the key can be taken out of the valve stem. Fig. 14 shows one method of compressing the valve spring so that the key may be removed. This will permit the valve spring to drop down and then the valve can be pushed upward and out of the engine. As soon as the valve has been removed, look for some mark which shows where the valve belongs. Sometimes the number of the cylinder is stamped on the valve. Separate the intake and exhaust valves and place them in rotation on the bench. To prevent any dirt from getting into the engine place a little cotton waste as shown in Fig. 16. Turn the engine over until the valve tappet which operates the valve you wish to grind is in the closed position. That is, as far down as it will go. This should be done with each valve before it is ground in for it if is not done the valve will not set. Take the valve and spread a little coarse grinding compound on the face which is indicated by F in Fig. 16. Slip a small spring over the valve stem and then place the valve in its own guide in the cylinder. Place the bit of the screwdriver or brace into the slot of the valve and place the handle of the screwdriver between the palms of the hands as shown in the illustration. Press down

slightly so that the valve face F touches the valve seat S. Rub the hands back and forth so that the valve makes half a turn each time. Each few turns release the pressure on the spring and allow the valve to leave its seat. This should be continued for about a minute and then the valve removed and cleaned with gasoline. Should the face and seat appear to have an even grey color indicating that the valve is seating correctly then the grinding is complete. If there are many black spots, use the coarse compounds, if few use the finer compounds. When all of the valves have been properly ground in they can be replaced as follows: Remember that before replacing the valve that both valves and valve seats should be thoroughly cleaned so that there is no grinding compound left. Place the valve in its guide. Then slip the valve spring and support over the valve stem. With the spring lifter compress the spring and while it is compressed slip the key through the hole in the valve stem. Sometimes the valve will go up when the spring is compressed. Tap the top of the valve slightly with the handel of a hammer and thus force it down. The valves are adjustable by means of the tappets which are fitted with nuts and lock nuts. The clearance between the tappet and the valve stem should be as small as possible. About .015 in. is allowed for the intake and .02 for the exhaust. These clearances may have to be altered some to eliminate noise and this should be adjusted when the engine is hot.

NYBERG PARTS

Q—Have a Nyberg car made in 1913 or 1914 which is equipped with a Beaver 6 cylinder L-head three block engine. Is this engine still being made? Where can a camshaft be secured?

2—Would it give better results to increase the size of the valve intake and exhaust. There are two plugs in each cylinder. Bosch and Delco distributor which gives good results.

3—Is it possible to get this camshaft in a solid cam? The one now in this car is adjustable. What is the best setting on this cam? It is now about 15 degrees on intake valve.—Wm. Niemeyer, East Moline, Ill.

1—We advise taking this matter up with the Beaver Mfg. Co., First St. and Oklahoma Ave., Milwaukee, Wis.

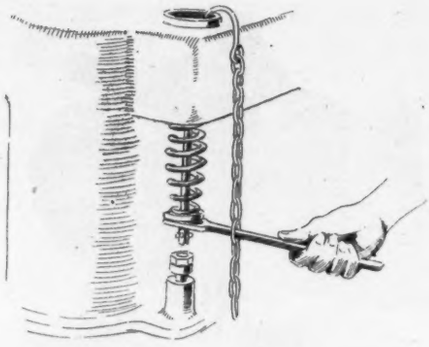


Fig. 14—Simple method of compressing the valve spring to permit removing the key in the valve stem

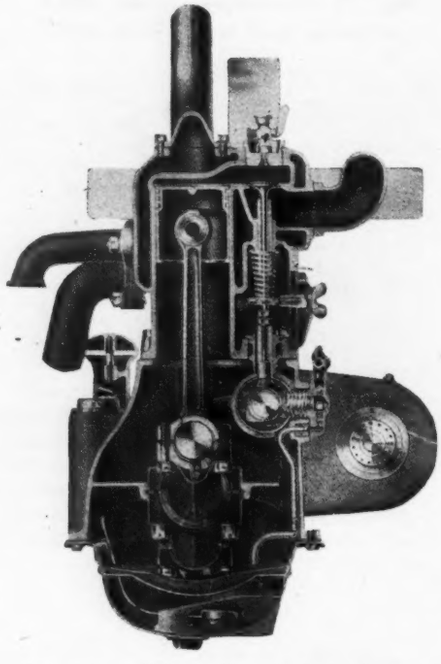


Fig. 15—Cross-sectional view of the 9N Continental engine

2—We do not believe that it would be advisable to increase the size of the valve ports unless you intend to use this car for racing purposes. In creasing the size of the valves will mean greater power, higher engine speed and greater

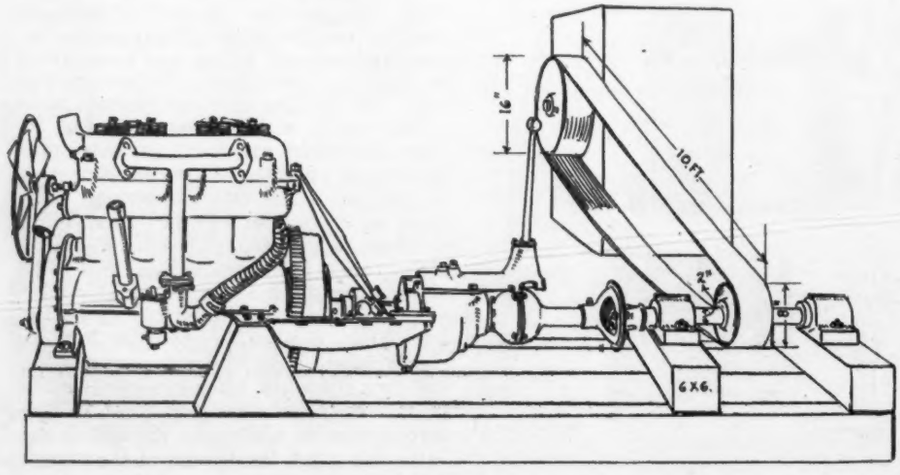


Fig. 13. Showing how to mount a Chevrolet engine for stationary work

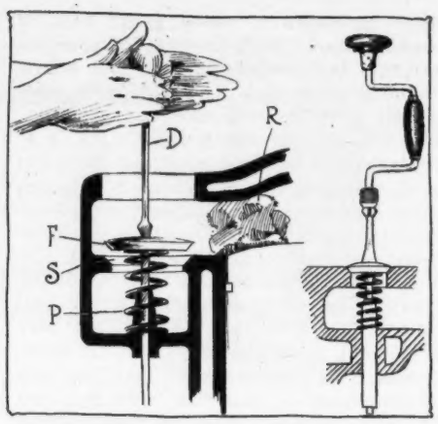


Fig. 16—Two methods of grinding in a valve using a light spring which will lift the valve from its seat just as soon as the pressure on the valve is released

fuel consumption. As long as the engine works very satisfactorily as you say it does we would not advise any changes unless the car is to be used for some particular purpose.

3—We do not know whether it is possible to secure this type of cam or not but the proper camshaft can be secured from the manufacturers.

CHANGING COMPRESSION

Q—What is the speed of the following cars, Buick light six, big six Studebaker, Essex, Hudson super six, and Roamer, either the 5 or 7 passenger models?

2—Would a Studebaker big six operate successfully with the compression increased five pounds or more and four to one gear ratio used? What compression higher than standard would you recommend for this engine? Desire to use Aluminite pistons. Also what lower gear ratio would you recommend for this high speed engine? What service, flexibility, power and speed should be obtained for this car remodeled in this way?

3—What is the best way of increasing compression on a demountable head engine when new pistons are to be installed, have the head planed or have the piston made with higher head?—Carl Ashworth, Chattanooga, Tenn.

1—It is impossible to give the absolute maximum speed of any car because of the variable factors which can not be controlled. However, under average conditions the Buick will make about 55 to 60 m.p.h., the Studebaker about the same, the Essex about 65 to 70, the Hudson and Roamer about the same.

2—Unless the compression is below about 65 to 70 pounds we do not advise increasing it. We cannot advise making a change of this kind unless the car is to be used for some particular purpose because in making a change of this kind you are undoing all that the designer and car manufacturer have done. The compression has been chosen to give the most satisfactory operation and we do not believe it should be changed. It is well to remember that if the gear ratio is changed to any great extent it will have to be done at a sacrifice of acceleration and satisfactory operation at low speed.

3—Either method would work out satisfactorily but we believe that the proper piston will give the best results.

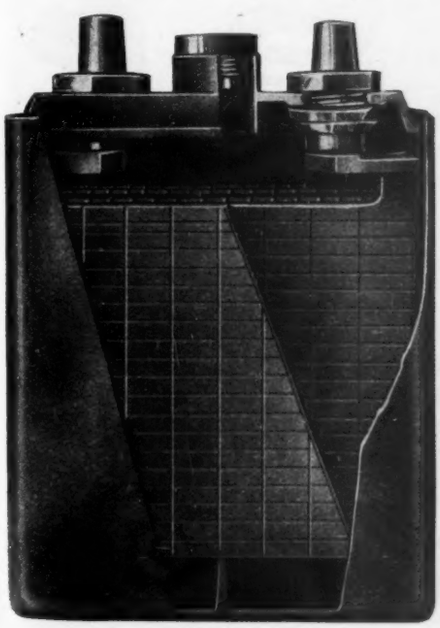
The Accessory Show Case

New Fitments for the Car

Thomson's Graphite Oil

GRAPHITE is one of the best spring lubricants but applying it in the old way is rather a dirty way. The illustration shows the method of applying graphite penetrating oil. It is claimed that a few drops squirted on the edge of each leaf will rapidly work through the spring and will dissolve rust. This oil can be used for many other purposes around the garage as it is applicable to frozen brakes or for releasing any bolt or pin that has rusted in. In its application to springs it is claimed to carry the pure graphite in solution, depositing it as a dry film on the surface of the leaves because the liquid element of the oil evaporates. It is manufactured and distributed by the Thomson Auto Specialties Co., of Columbus, O.

E. E. Battery Charger for Ford Cars



Sectional view of S. O. S. Battery

VICTOR STORAGE BATTERY

The Victor Storage Battery Co., Rock Island, Ill., mfgs. of the S. O. S. battery have recently had some very interesting tests completed on their battery which have shown the battery to be possessed of meritorious features. By a peculiar composition of the plates and the paste, exclusive to the S. O. S. battery overcharging it is said does not have the injurious effect of buckling the plates. Long use under adverse conditions, the report says, does not have the tendency to sulphate the plates.

Ford Battery Charger

The double EE charger for Ford cars is a chemical, electrolytic rectifier that rectifies the alternating current from the magneto of the Ford so that the positive uni-directional current may be used to charge the storage battery. The rectifier is easy of installation, requiring only two wire connections, a simple switch which is switched on when the engine is started and shut off when the engine is stopped. With this outfit the burned off headlight which is commonly experienced by the motorist is eliminated for the lights are connected directly to the battery, which is of six volt capacity. The only upkeep in connection with the device is that a small amount of water is added at regular periods to replace that loss through evaporation. This rectifier is manufactured by the Double EE Co., 2309 Bosworth Ave., Chicago. It lists at $5.

Essandee Rearsite Mirror

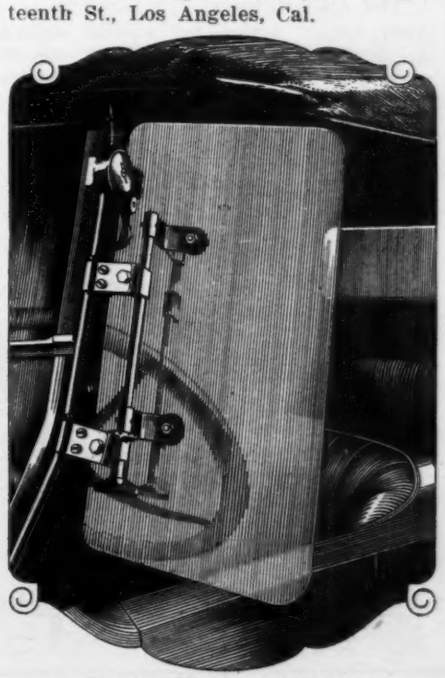
Thomson's Graphite Penetrating Oil for Springs

Shureloc Wings

The Shureloc Wings, illustrated herewith, are very useful as a wind deflector and in keeping out the dust and rain. These wings are of simple, substantial construction; are adjustable to any position and when installing there is no drilling or fitting required. These wings are manufactured by The Automotive Accessories, Inc., Kokomo, Ind., and are listed at $30 per pair complete with clamps to fit any car, and already to put on.

Essandee Rearsite Mirror

The Essandee Rearsite Mirror, shown herewith, can be adjusted to any desired angle without moving from your seat. In moving the mirror it is not even necessary to fool with a screw or an adjustable bracket but simply twist the mirror to the desired angle and it will stay there without working loose. Simplicity of construction makes it compact, neat of appearance, and is an ornament to a car as well as a utility. The Essandee is made in either round or oblong shapes for open or enclosed cars, is nickel finished and is listed at $5 by the Essandee Mfg. Sales Co., 330 W. Sixteenth St., Los Angeles, Cal.



Shurloc Windshield Wings

Service Equipment
Time Savers for the Shop

Tire Display Rack

THE Perfection Tire Display Rack illustrated herewith is so constructed as to hold each tire on a patented individual hanger which it makes it possible to remove any one tire without disturbing the rest of them in the rack. The use of a rack of this kind will enable you to store tires in less space and keep them in saleable order. One of the features of this rack is a locking device which simultaneously locks every tire in the rack. This is controlled by a lever which is locked by a Corbin lock. The prices vary according to the size of the rack. Any further information concerning this rack can be obtained from the Perfection Garage Equipment Company, Hagerstown, Md.

Wares Swivel Vise

Wares Swivel Vise, illustrated herewith, is provided with a yoke made of cold-rolled steel shafting. The essential principles of a vise which are incorporated in this device are weight, because the work is not only gripped but hammered; strength, because of the pressure put upon the jaws; flexibility, so that the vise can be used to hold work at different angles. This vise is polished, nickeled and enameled. The 5-in. jaw size weighs 125 lbs. and lists at $50. The vise is the product of J. L. Ware, 201 Harvard St., Minneapolis, Minn.

Perfection Valve Lifter

The valve lifter shown herewith is a very handy device for service station mechanics and is adaptable for use on any T or L head internal combustion engine. It can also be applied to engines having removable cylinder heads with valves in the head. The possibility of bending valve stems is eliminated by the fact that the jaws of the tool move in an absolutely direct perpendicular line with the plunger point, which rests at the center of the valve head. The standard model handles valve springs on practically all cars and has an extreme spread of 7½ in. with an extreme life of 7½ in. The Porter, Inc., San Diego, Calif., manufactures four models ranging from $6.50 to $15.50.

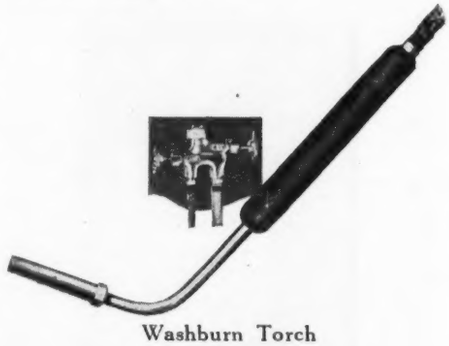
Washburn Torch

The new Washburn torch, shown herewith, is a combination gas, Prest-O-Lite and air burning torch that is adaptable for light welding, brazing, lead burning and soldering. The air supply can be obtained from an air tank, inflated automobile tire, or any compressed air line. Instead of a widely diffused flame, this torch directs a finely pointed flame of concentrated and intense heat which is always under the control of the operator.

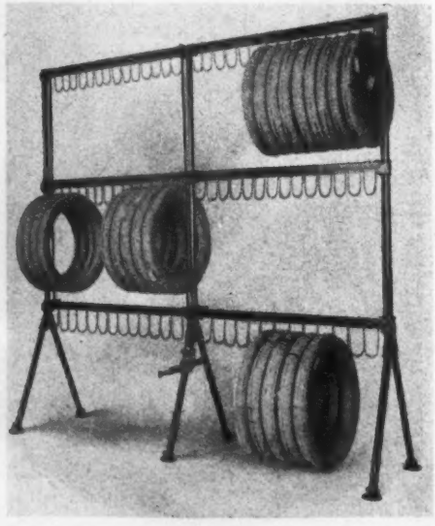
The Washburn mixer is a patented device designed for use with the Washburn torch. This eliminates use of pressure regulators and it is simply necessary to turn the wheel handles on the mixer to give the operator an automatic control of the flame. Two and one-half pounds pressure on the air is all that is required for light work. This torch weighs only 4 ounces and has a heat intensity of 5300 Fahr. It is manufactured by the Washburn Burner Corp., Kokomo, Ind.

Brake Relining Machine

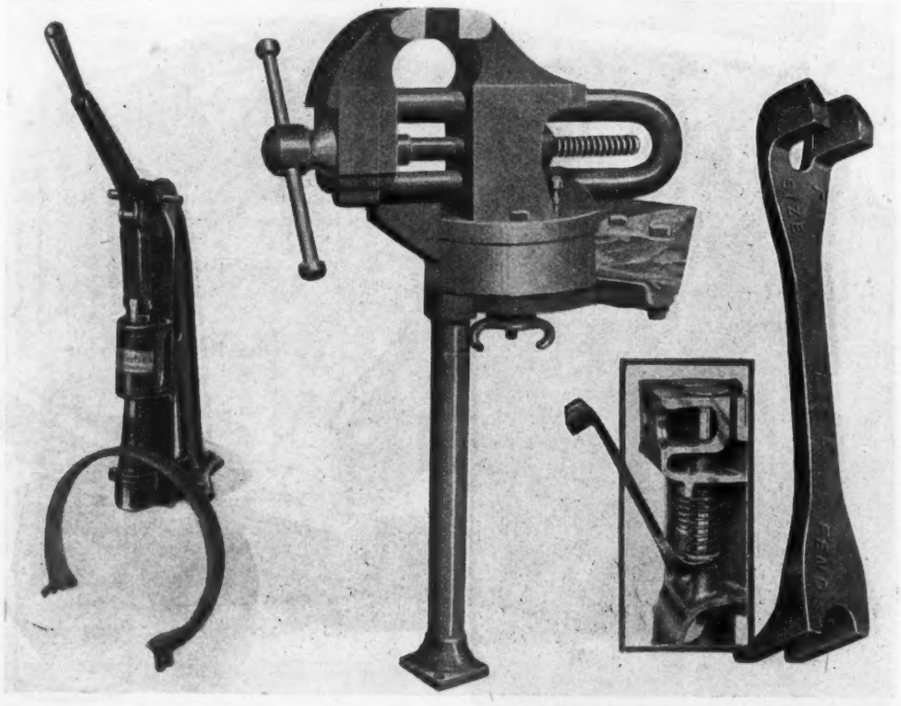
The Miller Transmission Band and Brake Relining Machine illustrated herewith is the universal Ford type. The fixture is constructed of high grade materials; the cutting knife and upsetting die are high quality tool steel. Regulation standard split rivets are used. They are forced into the lining with precision and are clinched in such a manner that they will not score the transmission drums. The machine is manufactured by the Miller Engineering Co., 6 N. Michigan Ave., Chicago, and lists at $37.50 f. o. b. Chicago.



Washburn Torch



Perfection Tire display rack

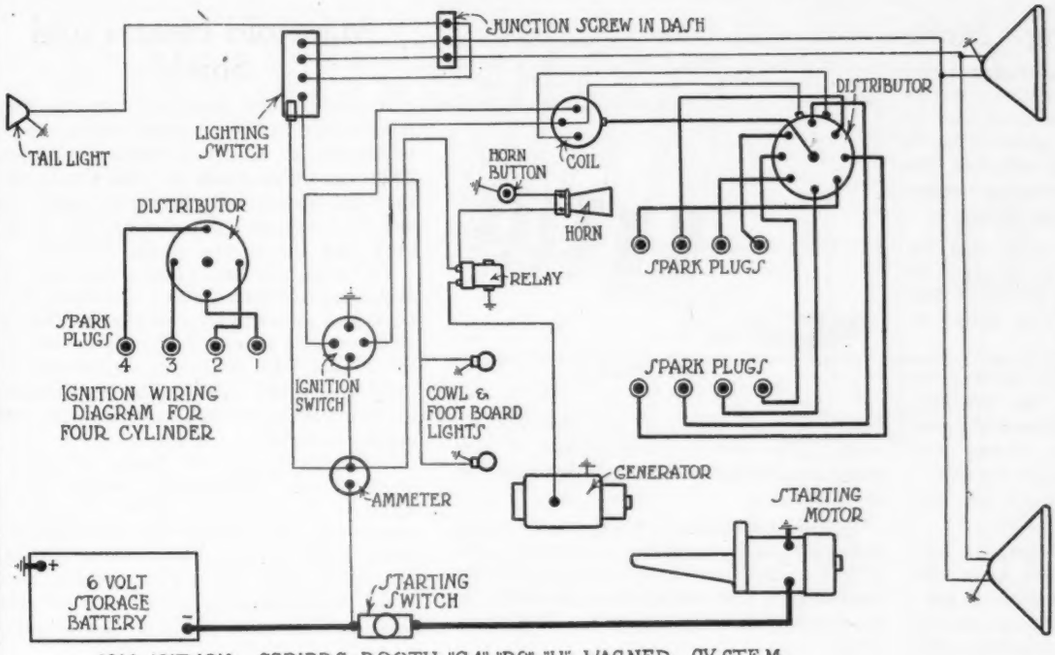


Brake Band and transmission band relining machine

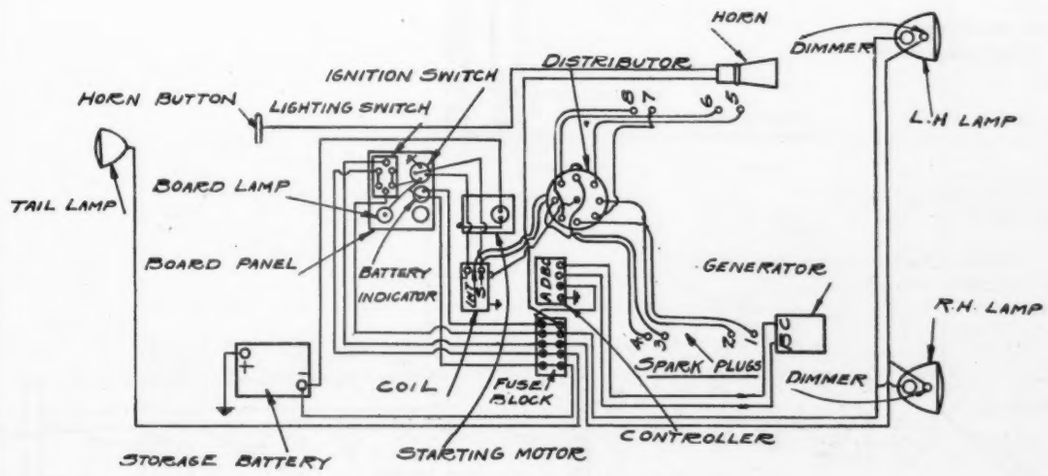
Wares Swivel vice

Valve Lifter

Motor Age Weekly Wiring Chart No. 92



1916-1917-1918 SCRIPPS-BOOTH "C4"-"D8"-"H" WAGNER SYSTEM



Name of car and date on which wiring diagrams have appeared in previous issues

Allen—June 17, '20
Apperson—Aug. 5, '20

Briscoe—May 6, '20
Buick—July 15, '20

Case—Aug. 5, '20
Chalmers—June 17, '20
Chandler—May 20, '20
Cole—June 10, '20
Crow-Elkhart—July 20, '20

Davis—Aug. 12, '20
Dort—Aug. 12, '20

Elcar—May 6, '20

Franklin—June 3, '20

General Battery Charging—Sept. 15, '19
General Magneto Diagram—June 15, '19
Grant—Aug. 12, '20

Harroun—July 15, '20
Haynes—June 24, '20
Hupmobile—May 27, '20

Internal Connections—July 10-17-24, '19

Jeffery—May 13, '20
Jordan—June 10, '20—July 22, '20

King—May 20, '20
Kissel—May 27, '20—Aug. 19, '20

Lexington—July 29, '20
Locomobile—June 6, '20

Moline-Knight—May 20, '20—July 22, '20
Moon—July 8, '20—July 29, '20—Aug. 19, '20

Peerless—May 13, '20
Pierce-Arrow—July 15, '20

Reo—July 22, '20
Roamer—Aug. 5, '20

Studebaker—July 1, '20
Stutz—July 8, '20
Special Systems for Fords—May 15-22, '19

The Automotive Repair Shop

Practical Maintenance Hints

Glass Sharpening Stone

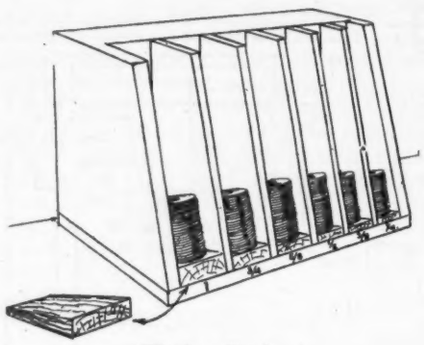
THE least expensive sharpening stone that a mechanic can devise consists of a piece of glass as heavy as can be found about 3 in. wide by about 6 in. in length. Rub one or both sides of the glass with another piece using emery and water to grind away the gloss.

To sharpen any kind of a tool on which a fine edge is desired, proceed in the usual manner, using a pinch of fine or flour of emery and a few drops of water.

Scrapers, knives, small drills and other tools can be given the sharpest desired edge, and it will also be found an excellent grinder for truing the points of platinum contacts or screws.

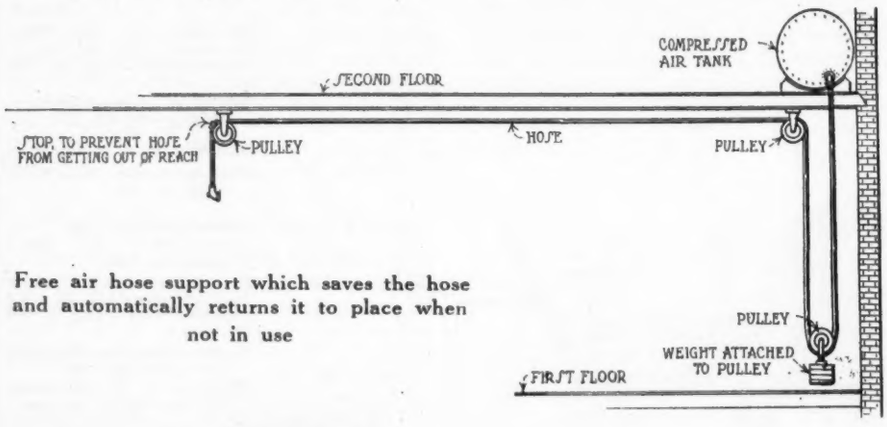
Washer Rack

System: A place for everything and everything in its place. Save time and temper by building for the shop a simple rack of the sort shown in the sketch herewith for holding round washers. The back inclines so that the washers lay back. The sketch gives details of construction better than descriptive wording.



Washer Rack

Editor MOTOR AGE: Suggestion for the free air-hose support is given below. Three pulleys are used two of which are attached to the ceiling and the other to the hose.—H. C. Morrison, Fullerton, Neb.



Free air hose support which saves the hose and automatically returns it to place when not in use

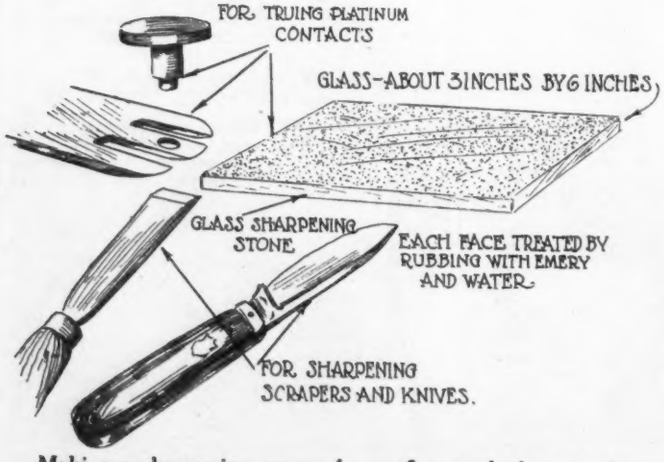
Manifold Heater and Shield

A cold intake manifold on the Ford contributes to the greatest extent toward misfiring of the two front cylinders. This condition leads to the impression that the piston and rings are faulty, because of the oil coated condition of the plug and the inside of the cylinder.

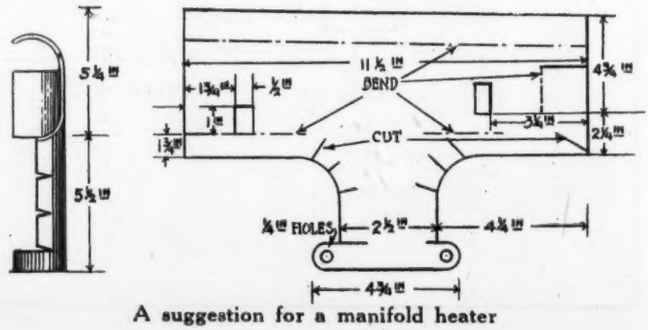
To break the cold draft from the fan and convey some of the beneficial heat from the exhaust pipe to the intake, the addition of a manifold shield, as detailed in sketch, will result in remedying the misfiring, allow the car to be throttled to a lower pace and increase the gasoline mileage.

To make the shield shown, procure a piece of sheet aluminum twelve incres square. The thickness is not important, other than the thicker the material the more heat it will carry, one-sixteenth inch plate will serve the purpose, however. Tinsnips or a heavy pair of scissors will cut the plate to the required shape.

Make a pattern on a piece of stout manilla paper and lay this in place for trial. Slight variations exist in the manifolds made in difierent years and you may want to correct for this when you cut the aluminum. The metal is very soft and is readily bent with the hands, shape it as much as possible to give good contact with the two manifolds before bolting it in place.


FOR TRUING PLATINUM CONTACTS
GLASS-ABOUT 3 INCHES BY 6 INCHES
GLASS SHARPENING STONE
EACH FACE TREATED BY RUBBING WITH EMERY AND WATER
FOR SHARPENING SCRAPERS AND KNIVES.

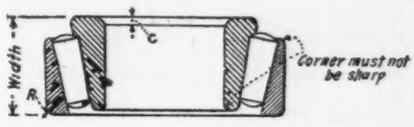
Making a sharpening stone of very fine grade from a piece of plate glass



A suggestion for a manifold heater

Dimensions and Numbers of Standardized Roller Bearings

Motor Age Mantenance Data Sheet No. 111



Narrow Series

Bearing Number	Bore				Diameter				Width				Chamfer C Not Less Than		Radius R		Eccentricity Tolerance in Inches	
	Mm.	Inches	Tolerance in Inches		Mm.	Inches	Tolerance in Inches		Mm.	Inches	Tolerance in Inches							
			Plus	Minus			Plus	Minus			Plus	Minus	Mm.	Inches	Mm.	Inches	Inner Race	Outer Race
RM 204.	20	.78740	.0002	.0004	47	1.85040	0	.0006	19.05	3/4	.020	.020	1	.04	1	.04	.0008	.0012
RM 205.	25	.98425	.0002	.0006	52	2.04725	0	.0008	19.05	3/4	.020	.020	1	.04	1	.04	.0008	.0012
RM 206.	30	1.18110	.0002	.0006	62	2.44095	0	.0008	19.05	3/4	.020	.020	1	.04	1	.04	.0008	.0012
RM 207.	35	1.37795	.0002	.0006	72	2.83465	0	.0008	22.22	7/8	.020	.020	1	.04	1	.04	.0008	.0012
RM 208.	40	1.57481	.0002	.0006	80	3.14962	0	.0008	25.40	1	.020	.020	2	.08	2	.08	.0008	.0012
RM 209.	45	1.77166	.0002	.0006	85	3.34647	0	.0008	25.40	1	.020	.020	2	.08	2	.08	.0010	.0016
RM 210.	50	1.96851	.0002	.0006	90	3.54332	0	.0008	25.40	1	.020	.020	2	.08	2	.08	.0010	.0016
RM 211.	55	2.16536	.0002	.0006	100	3.93702	0	.0008	30.16	1 1/8	.020	.020	2	.08	2	.08	.0010	.0016
RM 212.	60	2.36221	.0002	.0006	110	4.33072	0	.0008	34.92	1 3/8	.020	.020	2	.08	2	.08	.0010	.0016
RM 213.	65	2.55906	.0002	.0006	120	4.72443	0	.0008	34.92	1 3/8	.020	.020	2	.08	2	.08	.0010	.0016
RM 214.	70	2.75591	.0002	.0006	125	4.92128	0	.0008	36.51	1 7/16	.020	.020	2	.08	2	.08	.0010	.0016
RM 215.	75	2.95277	.0002	.0006	130	5.11813	0	.0008	36.51	1 7/16	.020	.020	2	.08	2	.08	.0010	.0016
RM 216.	80	3.14962	.0002	.0006	140	5.51183	0	.0008	41.27	1 5/8	.020	.020	3	.12	3	.12	.0012	.0018
RM 217.	85	3.34647	.0002	.0007	150	5.90554	0	.0012	44.45	1 3/4	.020	.020	3	.12	3	.12	.0012	.0018
RM 218.	90	3.54332	.0002	.0007	160	6.29924	0	.0012	50.80	2	.020	.020	3	.12	3	.12	.0012	.0018
RM 219.	95	3.74017	.0002	.0007	170	6.69294	0	.0012	55.56	2 1/8	.020	.020	3	.12	3	.12	.0012	.0018
RM 220.	100	3.93702	.0002	.0007	180	7.08664	0	.0012	60.32	2 3/8	.020	.020	3	.12	3	.12	.0012	.0018
RM 221.	105	4.13387	.0002	.0007	190	7.48035	0	.0012	65.09	2 1/8	.020	.020	3	.12	3	.12	.0012	.0018
RM 222.	110	4.33072	.0002	.0007	200	7.87405	0	.0012	69.85	2 3/4	.020	.020	3	.12	3	.12	.0012	.0018

Wide Series

Bearing Number	Bore				Diameter				Width				Chamfer C Not Less Than		Radius R		Eccentricity Tolerance in Inches	
	Mm.	Inches	Tolerance in Inches		Mm.	Inches	Tolerance in Inches		Mm.	Inches	Tolerance in Inches							
			Plus	Minus			Plus	Minus			Plus	Minus	Mm.	Inches	Mm.	Inches	Inner Race	Outer Race
RM-304.	20	.78740	.0002	.0006	52	2.04725	0	.0008	22.22	7/8	.020	.020	1	.04	1	.04	.0008	.0012
RM-305.	25	.98425	.0002	.0006	62	2.44095	0	.0008	25.40	1	.020	.020	1	.04	1	.04	.0008	.0012
RM-306.	30	1.18110	.0002	.0006	72	2.83465	0	.0008	30.16	1 1/8	.020	.020	2	.08	2	.08	.0008	.0012
RM 307.	35	1.37795	.0002	.0006	80	3.14962	0	.0008	34.92	1 3/8	.020	.020	2	.08	2	.08	.0008	.0012
RM 308.	40	1.57481	.0002	.0006	90	3.54332	0	.0008	36.51	1 7/16	.020	.020	2	.08	2	.08	.0008	.0012
RM-309.	45	1.77165	.0002	.0006	100	3.93702	0	.0008	30.69	1 7/16	.020	.020	2	.08	2	.08	.0010	.0016
RM-310.	50	1.96851	.0002	.0006	110	4.33072	0	.0008	44.45	1 3/4	.020	.020	2	.08	2	.08	.0010	.0016
RM 311.	55	2.16536	.0002	.0006	120	4.72443	0	.0008	49.21	1 15/16	.020	.020	2	.08	2	.08	.0010	.0016
RM-312.	60	2.36221	.0002	.0006	130	5.11813	0	.0008	53.97	2 1/8	.020	.020	3	.08	3	.08	.0010	.0016
RM 313.	65	2.55906	.0002	.0006	140	5.51183	0	.0008	58.74	2 5/16	.020	.020	3	.12	3	.12	.0010	.0016
RM-314.	70	2.75591	.0002	.0007	150	5.90554	0	.0012	63.50	2 1/2	.020	.020	3	.12	3	.12	.0010	.0016
RM-315.	75	2.95277	.0002	.0007	160	6.29924	0	.0012	68.26	2 11/16	.020	.020	3	.12	3	.12	.0010	.0018
RM 316.	80	3.14962	.0002	.0007	170	6.69294	0	.0012	68.26	2 11/16	.020	.020	3	.12	3	12	.0012	.0018
RM 317.	85	3.34647	.0002	.0007	180	7.08664	0	.0012	73.02	2 7/8	.020	.020	3	.12	3	.12	.0012	.0018
RM 318.	90	3.54332	0008	.0007	190	7.48035	0	.0012	73.02	2 7/8	.020	.020	3	.12	3	.12	.0012	.0018
RM 319.	95	3.74017	.0002	.0007	200	7.87405	0	0012	77.79	3 1/16	.020	.020	3	12	3	12	0012	0018
RM-320.	100	3.93703	.0002	0007	215	8.46460	0	.0012	82.55	3 1/4	.020	.020	3	12	3	12	.0012	.0018

Motor Age Monthly Guide to Tractors

Line Number	Tractor and Model	Manufacturer	Drawbar horsepower	Belt horsepower	Number plows recommended	Size separator recommended	Pounds pull drawbar	Weight	Price	Traction	Diameter drive wheels	Make of engine	No. and type of cylinder	Bore and stroke	Normal R. P. M.
1	Allis-Chalmers, 18-30	Allis-Chalmers Mfg Co., Milwaukee, Wis	18	30	4	.....	3000	6000	.....	Wh.	50	Own	4 Ver.	4¾ x 6½	830
2	Allwork, C	Electric Wheel Co., Quincy, Ill	14	28	3	28	3000	5000	$1,675	Wh.	48	Own	4 Ver.	5 x 6	800
3	Appleton	Appleton Mfg. Co., Batavia, Ill	12	20	2-3	22	2000	4900	1,500	Wh.	54	Buda	4 Ver.	4¼ x 5½	1050
4	Aultman-Taylor	Aultman-Taylor Machinery Co., Mansfield, O	15	30	4	28	2800	7500	2,300	Wh.	70	Clim	.....	5 x 6½	900
5															
6	Automotive, B-3	Automotive Corp	12	24	2	26	2000	3400	.....	Wh.	40	Herc.	4 Ver.	4 x 5½	1000
7	Aultman-Taylor		22	45	6	32	4800	13000	3,700	Wh.	70	Own	4 Hor.	5½ x 8	600
8	Aultman-Taylor		30	60	8-12	.....	8000	23000	4,800	Wh.	90	Own	4 Hor.	7 x 9	500
9	Automotive														
10	Avery, 8-16		8	16	2-3	22x32	1800	4900	.....	Wh.	50	Own	2 Hor.	5½ x 6	600-750
11	Avery, 12-25		12	25	3-4	20x30	2800	7500	.....	Wh.	56	Own	2 Hor.	6½ x 7	600-700
12	Avery, 14-28		14	28	3-4	24x36	3000	7540	.....	Wh.	60	Own	4 Hor.	4⅝ x 7	700-900
13	Avery, 18-36	Avery Co., Peoria, Ill	18	36	4-5	24x36 / 28x46	3500	9250	.....	Wh.	65	Own	4 Hor.	5½ x 6	650-750
14															
15	Avery, 25-50		25	50	5-6	28x46 / 32x54	4800	12500	.....	Wh.	69	Own	4 Hor.	6½ x 7	600-700
16															
17	Avery, 40-80		40	80	8-10	36x60	8600	22000	.....	Wh.	87½	Own	4 Hor.	7¾ x 8	500-600
18	Blue J	Dart Truck & Trac. Corp., Waterloo, Ia	15	30	3-4	28	2500	4500	2,000	Wh.	42	Buda	4 Ver.	4½ x 6	1050
19	Boring	Boring Tractor Corp., Rockford, Ill	....	24	2-16	24x36	.....	3600	1,595	Wh.	54	Wauk.	4 Ver.	4⅜ x 5¼	1000
20	Bull	Bull Tractor Co., Anderson, Ind	12	24	2-3	26	1000	4996	1,200	.....	60	Toro	2 Hor.	5½ x 7	750
21	Burn-Oil	Burn-Oil Tractor Co., Peoria, Ill	....	30	3-4	26	3000	5500	1,650	Wh.	56	Own	2 Hor.	6¾ x 7	700
22	Case, 10-18		10	18	2-3	20x28	1665	3820	1,200	Wh.	42	Own	4 Ver.	3⅞ x 5	1050
23	Case, 15-27	J. I. Case T. M. Co., Racine, Wis	15	27	3-4	26x46	2500	6460	1,800	Wh.	52	Own	4 Ver.	4½ x 6	900
24	Case, 22-40		22	40	5	32x54	3760	10300	3,100	Wh.	56	Own	4 Ver.	5½ x 6¾	850
25															
26	Caterpillar, 5-Ton	Holt Mfg. Co., Peoria, Ill	25	40	4	32x52	3100	9400	.....	Cr.	.....	Own	4 Ver.	4¾ x 6	1050
27	Caterpillar, 10-Ton		40	60	6	40x60	5000	18800	.....	Cr.	.....	Own	4 Ver.	6½ x 7	700
28	Cletrac, W	Cleveland Trac. Co., Cleveland, Ohio	12	20	2	24x40	1285	3420	1,395	Cr.	.....	Own	4 Ver.	4 x 5½	1265
29	Coleman	Coleman Trac. Sales Co., Kansas City, Mo	16	30	3	28x48	3000	5200	1,850	.....	44	Clim.	4 Ver.	5 x 6½	750
30	Dakota, 4	Pope Mfg. Co, Watertown, S. D	15	27	3	24	2000	5700	1,750	Wh.	42	Doman	4 Ver.	4¾ x 6	800
31	Dill	Dill Trac. Mfg. Co., Little Rock, Ark	20	....	3	.....	.....	4400	2,480	Wh.	42	Cont.	4 Ver.	4½ x 5½	900
32	Eagle, F	Eagle Mfg. Co., Appleton, Wis	12	22	2-3	24	2400	5850	1,390	Wh.	48	Own	2 Hor	7 x 8	450
33	Eagle, F		16	30	3-4	28x48	3200	7100	1,850	Wh.	52	Own	2 Hor	8 x 8	450
34	E-B, Q		12	20	3	24	2000	6500	.....	Wh.	60	Own	4 Ver.	4¾ x 5	850
35	E-B, 12-20, AA	Emmerson, Brantingham Co., Rockford, Ill	12	20	3	24	2600	4355	.....	Wh.	54	Own	4 Ver.	4¾ x 5	900
36	E-B, 20-35		20	35	5	28	3300	9700	.....	Wh.	72	Own	4 Ver.	5¼ x 7	750
37	E-B, Reeves		40	65	8-10	44	10000	22750	.....	Wh.	90	Spec.	4 Ver.	7¼ x 9	500
38	Fitch, 4	Four-Drive Trac. Co., Big Rapids, Mich	20	35	3-4	28x30	3200	6000	3,300	Wh.	42	Clim.	4 Ver.	5 x 6½	850
39	Flour City, Jr		14	24	3	24	.....	.....	.....	.....	60	Own	4 Ver.	5 x 5	800
40	Flour City	Kinnard & Sons Mfg. Co., Minneapolis, Minn	20	35	4-5	28	.....	10000	.....	.....	72	Own	4 Ver.	5¼ x 6	800
41	Flour City		30	50	6-8	30	.....	14000	.....	.....	84	Own	4 Ver.	6¼ x 7	550-600
42	Flour City		40	70	8-10	36	.....	21000	.....	.....	96	Own	4 Ver.	7½ x 9	450-500
43	Fordson	Ford Motor Co., Highland Park, Mich	....	20	2	20x34	1800	2700	850	Wh.	42	Own	4 Ver.	4 x 5	1000
44															
45	Franklin Flexible, B	Franklin Trac. Co., Greenville, Ind	15	30	2-3	22x36	2500	3500	1,695	Cr.	None	Erd.	4 Ver.	4¼ x 6	1000
46	Frick	Frick Co., Waynesboro, Pa	12	24	3	22x26	.....	5800	.....	Wh.	60	Erd.	4 Ver.	4 x 6	900-1000
47	Frick		15	28	3-4	26	.....	6000	.....	Wh.	60	Beav.	4 Ver.	4¾ x 6	900-1000
48	Full Jewel	Lauson, John Mfg Co., New Holstein, Wis	15	30	3-4	24x30	3000	6500	2,285	Wh.	54	Beav.	4 Ver.	4¾ x 6	950
49	G-O	General Ordnance Co., Cedar Rapids, Ia	14	28	3	28	.....	4200	1,485	Wh.	46	Wauk.	4 Ver.	4½ x 5¾	1000
50	Grain Belt, 18-36	Grain Belt Mfg. Co., Fargo, N. D	18	36	4	24	.....	6800	2,500	.....	60	Wauk.	4 Ver.	4¾ x 6¾	900
51	Gray	Gray Tractor Co, Minneapolis, Minn	18	36	4	.....	2700	6185	.....	.....	54	Wauk.	4 Ver.	4¾ x 6¾	850
52	Hart-Parr, 30	Hart-Parr Co., Charles City, Ia	....	30	3	26	3000	5570	1,495	Wh.	52	Own	2 Hor.	6½ x 7	750
53															
54	Heider, C	Rock Island Plow Co., Rock Island, Ill	12	20	3	24	2000	6000	.....	Wh.	57	Wauk.	4 Ver.	4½ x 6¾	900
55															
56	Holton, 2-A	Holton Tractor Co., Indianapolis, Ind	10	16	2-12	.....	.....	2500	1,250	Wh.	42	Le Roi	4 Ver.	3⅛ x 4½	1250
57	Huber, 12-25	Huber Mfg. Co., Marion, Ohio	12	25	3	24x42	2400	5000	.....	Wh.	60	Wauk.	4 Ver.	4½ x 5¾	1000
58	Illinois	Illinois Tractor Co., Bloomington, Ill	18	30	4	24x28	3500	5200	2,375	Wh.	54	Clim.	4 Ver.	5 x 6½	800
59	International	International Harvester Co., Chicago	15	30	4	.....	2500	8990	.....	Wh.	66	Own	4 Hor.	5¼ x 8	575
60	J. T., N	J. T. Tractor Co., Cleveland, Ohio	16	30	3	30	3200	7300	2,800	Cr.	48	Chief	4 Ver.	4¾ x 6	1000
61	Kardell Utility	Kardell Trac. & Tr. Co., St. Louis, Mo	10	20	2	.....	.....	3500	1,350	.....	.....	Wis.	4 Ver.	4 x 5	1200
62	Keck-Gonnerman, C	Keck Gonnerman Co., Mt. Vernon, Ind	15	30	3	24x40	2500	6500	1,500	Wh.	60	Own	2 Hor.	7¼ x 8	650
63	Klumb, F	Dubuque Trac. & Tr. Mfg. Co., Dubuque, Ia	16	32	3	28	3200	525)	.....	Wh.	45	Clim.	4 Ver.	5 x 6½	800
64	La Crosse, G	La Crosse Trac. Co., La Crosse, Wis	12	24	3	24	2000	4000	945	Wh.	56	Own	2 Hor.	6 x 7	900
65	Leader, B		12	24	2	20	2000	5200	.....	.....	48	Own	2 Hor.	6¼ x 6	800
66	Leader, N	Dayton-Dowd Co., Quincy, Ill	16	32	3-4	28	3500	5800	2,150	Wh.	54	Clim.	4 Ver.	5 x 6½	800
67	Leader, C		18	36	3-4	28	4000	6500	2,650	Cr.	.....	Twin	4 Ver.	5 x 7½	750
68	Leader, D		20	40	4-5	28	5000	6500	3,150	Cr	.....	Doman	4 Ver.	6 x 7	750
69	Liberty	Liberty Tractor Co., Minneapolis, Minn	18	32	4	30	3380	5900	2,475	Wh.	48	Clim.	4 Ver.	5 x 6½	850
70	Magnet, B-14-28	Magnet Tractor Co., Minneapolis, Minn	14	28	3	24	2600	4500	1,850	Wh.	48	Wauk.	4 Ver.	4½ x 6¼	900
71	Mobile	Mobile Tractor Co., Mobile, Ala	12	24	2	26	2000	3400	1,450	Wh.	40	Herc.	4 Ver.	4 x 5⅛	1000
72	Moline Universal	Moline Plow Co., Moline, Ill	9	18	2	24	2000	3380	.....	Wh.	44	Own	4 Ver.	3½ x 5	.....
73	Monarch	General Tractors, Inc., Chicago	18	30	4	28	3300	8000	2,700	Cr.	.....	Beav.	4 Ver.	4¾ x 6	900

Abbreviations: **Traction**—wh., wheel; Cr. crawler. **Engine**—Beav., Beaver; Veer., Veerac; Herc., Hercules; Wauk., Waukesha; Buff., Buffalo; Asso., Associated Manufacturers; Auto., Automatic; Weld., Weldely; Clim., Climax; Twin, Twin City; Cont., Continental; Ruten., Rutenber; Over., Overland; Kenn., Kenneth. **Cylinders**—Ver., vertical; Hor., horizontal; Opp., opposed. **Fuel**—G., gasoline; K., kerosene; D., distillate. **Carburetor**—Ray., Rayfield; King., Kingston; Holl., Holley; Scheb., Schebler; Ben., Bennett; Web., Webster; Zeph., Zephyr; Ens., Ensign; Strom., Stromberg; Till., Tillotson; Zen., Zenith; Car., Carter. **Air-Cleaner**—Donal., Donaldson; Ben., Bennett; Hol., Holley; Par., Parrett; Rain., Rainstrom. **Magneto**—A-K., Atwater-Kent; Sum., Sumter; Eise., Eiseman; Berl., Berling. **Clutch**—B. & B., Borg & Beck; Bier., Bierman; Mun., Muncie; Rock., Rockwood; Spec., special. **Gearset**—B. & S., Brown & Sharpe; Nutt., Nuttall. **Gearset type**—Sl. G., sliding gear; Sel. G., selective gear; Fr., friction; Plan., planetaary; Sl. J. C., sliding jaw clutch; Sl. Fr., sliding frame. **Final Drive**—S. G., spur gear; Ch., chain; D. R., double reduction; B. G., bull gear. **Drive**—Op., open; In., inclosed.

and Their Technical Specifications

Line Number	Fuel	Make and size of carburetor	Make of air cleaner	Make of magneto	Make of clutch	Make of gearset	Type of gearset	Make of radiator	Make of bearings in transmission	Make of bearings in front axle	Make of bearings in rear axle	Belt pulley diameter	Belt pulley R. P. M.	Belt speed F. P. M.	Speeds forward	Speed range M. P. H.	Recommended plowing speed	Final drive	Drive	Furrow wheel	Line Number
1	G-K	1½-King.	Ben.	Opt.	Own	Own	Sl. G.	Own	Hyatt	Own	Hyatt	15	830	3200	2	2.3-2.8	2.8	.....	In.	Yes	1
2	K	1½-King.	Ben.	King.	Own	Own	Sl. G.	Perfex	Hyatt	.....	Own	13½	800	3800	3	1⅞-3¾	2½	B. G.	In.	.....	2
3	G-K	1¼-Scheb.	Ben.	Bosch	B. & B.	Nutt	Sl. G.	Perfex	Hyatt	Own	Hyatt	7½	825	2600	2	2¼-3½	.....	I. G.	.....	Yes	3
4	G-K-D	1⅜-King.	Ben.	Eise.	Own	Own	Sl. G.	.....	Hyatt	Own	Hyatt	20	450	2400	1	2.2-2.49	2.5	I. G.	.....	Yes	4
5																					5
6	G-K	1¼-Ben.	Ben.	Eise.	B. & B.	Own	Sl. G.	McCord	Opt.	Timk.	Timk.	10	996	2600	2	2¼-4	2¼	I. G.	In	Yes	6
7	G-K-D	2 -King.	.....	Eise.	Own	Own	Sl. G.	Own	Own	Own	Own	20	600	3150	.....	1-2.93	2.13	B. G.	.....	No	7
8	G-K-D	2½-King.	.....	Eise.	Own	Own	.....	Own	Own	Own	Own	24	500	3150	2.2	1-2.2	2.2	B. G.	.....	No	8
9																					9
10	G-K-D-A	1¼-King.	.....	K-W	Own	Own	Sl. Fr.	Own	.....	Own	Own	17½	600	2750	2	1¾-3	1¾	S. G.	Op.	.....	10
11	G-K-D	1½-King.	.....	K-W	Own	Own	Sl. Fr.	Own	.....	Own	Own	19½	600	2910	2	1¾-2¾	1¾	S. G.	Op.	.....	11
12	G-K-D	1¼-King.	.....	K-W	Own	Own	Sl. Fr.	Own	.....	.....	Own	16	700	2930	2	2½-3½	2	S. G.	Op.	.....	12
13	G-K-D	1½-King.	.....	K-W	Own	Own	Sl. Fr.	Own	.....	Own	Own	18	650	3065	2	2-3	2	S. G.	Op.	.....	13
14																					14
15	G-K-D	2 -King.	.....	K-W	Own	Own	Sl. Fr.	Own	.....	Own	Own	22	600	2880	2	2-3	2	S. G.	Op.	.....	15
16																					16
17	G-K-D	2 -King.	.....	K-W	Own	Own	C. M.	Own	.....	Own	Own	26	500	3400	2	1¾-2¾	1¾	S. G.	Op.	.....	17
18	G	1¼-King.	R. W.	Split.	Delt.	Own	Sel.	Own	Gurney	Timk.	Timk.	12	710	2600	3	1¼-6	2½	D. R.	In.	Yes	18
19	G-K	1¼-King.	Ben.	King.	Twin	Own	Sl. G.	Perfex	Hyatt	Hyatt	Hyatt	.....	421	.....	2	2-3	2½	Ch.	In.	Yes	19
20	G-K-D	1½-King.	Donald.	K-W	.....	.....	.....	.....	.....	.....	Hyatt	12	750	.....	1	2.4-2¾	2.4	B. G.	.....	.....	20
21	K	1½-Scheb.	Ben.	K-W	Own	Own	Sl. G.	Eureka	.....	Own	Own	13	700	2600	2	2-3	3	I. G.	In.	Yes	21
22	G-K-D	1½-King.	Own	Berl.	Own	Own	Sl. G.	Own	Hyatt	Own	Hyatt	14¼	1050	3731	2	2¼-3½	3¼	S. G.	In.	No	22
23	G-K-D	1⅜-King.	Own	Bosch	Own	Own	Sl. G.	Own	Hyatt	Own	Hyatt	16	900	3762	2	2¼-3	2¼	S. G.	In.	No	23
24	G-K-D	2 -King.	Own	Bosch	Own	Own	Sl. G.	Own	Hyatt / Timk.	Timk.	Hyatt	16½	850	3669	2	2.2-3.2	2.2	S. G.	In.	No	24
25																					25
26	G	1½-Scheb.	Donald.	Eise.	Own	Own	Sl. G.	Modine	Hyatt	Hyatt	Hyatt	12	1012	3150	3	1.5-5.7	3	G	In.	No	26
27	G	2 -King.	Donald.	K-W	Own	Own	Sl. G.	Own	Hyatt	Hyatt	Hyatt	14	850	3120	3	1.65-4.78	3	G.	In.	No	27
28	G-K-D	1½-King.	R. & B.	Teagle	B. & B.	Own	Sl. G.	McCord	.....	.....	Timk.	8	1265	2500	1	1-3½	3	I. G.	In.	.....	28
29	G-K	1½-Ben.	Ben.	Dixie	Own	Own	Sl. G.	Own	Opt.	Own	Own	14	750	2750	2	2-3	3	Worm	.....	.....	29
30	K	1¼-Linga.	John.	K-W	Bier.	Own	Sl. G.	S-J	Own	Own	Own	14	800	2500	1	3	3	Ch.	.....	Yes	30
31	G	1½-King.	Donald.	Bosch	B. & B.	Cotta	Sl. G.	Eureka	S. K. F.	Hyatt	Hyatt	.....	.....	.....	3	1-5	3	Ch.	.....	.....	31
32	G-K	1½-Scheb.	Ow	Dixie	Own	Own	Sl. G.	Perfex	Hyatt	Own	Own	20	450	2350	2-3	1½	2	G.	.....	Yes	32
33	G-K	1¾-Scheb.	Own	Dixie	Own	Own	Sl. G.	Perfex	Hyatt	Own	Own	24	450	2827	2-3	1½	2	G.	.....	Yes	33
34	K	1½-Ben.	Ben.	K-W	Own	Own	Sl. G.	Perfex	Own	Own	Own	12	800	2225	3	1⅞-3.64	.....	B. G.	Op.	Yes.	34
35	K	1½-Strom.	Ben.	K-W	Own	Own	Sl. G.	Perfex	Hyatt	.....	.....	12	900	2800	2	2.01-2.78	2.78	I. G.	In.	No	35
36	K	1½-Ben.	Ben.	K-W	Own	Own	Sl. G.	Modine	Hyatt	Own	Hyatt	16	597	2500	2	1.81-2.33	2.33	G.	Op.	No	36
37	K	2½-King.	Ben.	K-W	Own	Own	Sl. G.	Perfex	Hyatt	Own	Hyatt	22	500	2880	1	2	.....	G.	Op.	.....	37
38	K	1½-King.	Ben.	Dixie	B. & B.	Cotta	Ind. Cl.	Spirex	Timk.	Timk.	Timk.	14	650	2275	3	¾-4	2½	.....	.....	No	38
39	G-K	1½-Scheb.	.....	K-W	Own	Own	.....	Long	Hyatt	.....	.....	26	320	.....	2	2¼-3¼	2¼	G.	.....	.....	39
40	G-K	1½-Scheb.	.....	K-W	Own	.....	Sel.	Long	.....	.....	.....	26	350	.....	2	2¼-3	2¼	G.	.....	.....	40
41	G-K	2 -Scheb.	.....	K-W	Own	.....	.....	Long	.....	.....	.....	32	275	.....	1	.....	2½	G.	.....	.....	41
42	G-K	2½-Scheb.	.....	K-W	Own	.....	.....	Long	.....	.....	.....	34	275	.....	1	.....	2½	G.	.....	.....	42
43	K	-Holl.	Own	Own	Own	Own	Sel.	Own	Gurney / S. R. B.	Timk.	Gurney / S. R. B.	9½	1000	2480	3	1-8	2¾	Worm	In.	.....	43
44																					44
45	G-K	1¼-King.	Ben.	Eise.	B. & B.	Own	St. G.	McCord	N. D.	Timk.	Timk.	10	1000	2618	3	2-3-4	3	B. G.	In.	None	45
46	K	-King.	Ben.	King.	Own	Nutt	S.	Perfex	Hyatt	Own	Own	13	900	3060	2	2.3-3.8	2½	S. G.	.....	Yes	46
47	K	-Ben.	Ben.	Dixie	Own	Nutt.	S.	Perfex	Hyatt	Own	Own	13	900	3060	2	2.3-3.8	2½	S. G.	.....	Yes	47
48	K	1¼-King.	.....	Dixie	Own	Own	Sl. G.	Perfex	Hyatt	Timk.	Hyatt	18	475	2200	2	1½-2½	2½	G.	In.	.....	48
49	G-K	1¼-King.	Ben.	Eise.	.....	Own	C. M.	Perfex	S. K. F.	.....	.....	10	970	.....	6	1¾-3	2½	S G.	In.	No	49
50	G-K	-Strom.	Own	Dixie	Own	Own	Own	Own	Hyatt	Own	Own	14	.....	.....	2	.....	2½	S. G.	.....	.....	50
51	G-K	1½-Ben.	Ben.	Bosch	Own	Own	.....	S-J	Hyatt	.....	Hyatt	11⅜	850	2900	2	2½	2¾	Ch.	In.	Yes	51
52	K	K-Shunt	Own	K-W	Own	Own	Sl. G.	S-J	S. K. F. / Hyatt	Own	Own	14	750	2750	2	2-3	3	I. G.	Op.	Yes	52
53														....							53
54	G-K	1¼-King.	Ben.	Dixie	Own	.....	Fr.	Perfex	U. S.	.....	Own	14	400-900	2200	7	1-5	2¼	B. G.	Op.	Yes	54
55																					55
56	G	⅜-King.	Ben.	Eise.	Detl.	Covert	Sl. G.	Perfex	.....	.....	.....	6	1250	1963	3	¾-4	2¼	I. G.	.....	Yes	56
57	G-K	¼-King.	Ben.	King.	Own	Own	Sel.	Perfex	G. & H.	Own	Own	13	1000	.....	2	2.43-3.75	2.43	S. G.	Op	Yes	57
58	K	1½-Strom.	Ben.	Dixie	Twin	Foote	Sl. G.	Modine	Hyatt	Hyatt	Hyatt	14	600	2400	2	2½-3.4	2½	S. G.	In.	Yes	58
59	G-K-D	-Own	.....	K-W	Own	.....	Sl. G.	.....	Own	Own	.....	18	575	.....	.....	2¼-2¾	2¾	Ch.	.....	.....	59
60	K	1½-Own	Ben.	K-W	Own	Covert	Sel.	McCord	Timk.	Hyatt	Hyatt	10	1000	2600	3	1¼-5	2½	S. G.	In.	No	60
61	G	1-Carter	Ben.	Dixie	Detl.	Own	Sel.	Eureka	Hyatt	Timk.	Gurney	10	1200	3100	2	2¼-4	3	S. G.	In	Yes	61
62	K	2-Scheb.	Ben.	Bosch	Own	Own	Sl. G.	Own	S.K.F.	Own	Own	11½	650	.....	3	2½-3½	3	S. G.	In.	Yes	62
63	K	1½-Strom.	Ben.	Dixie	Own	Own	C. M.	Hooven	Hyatt	Hyatt	Hyatt	14	800	2600	2	2½-4	2½	.....	In.	.....	63
64	K	1½-King.	Ben.	.....	Own	Own	.....	Long	Hyatt	Hyatt	Hyatt	7x11	750	2600	1	2-2¾	2½	.....	.....	Yes	64
65	K	1½-King.	Own	King.	Own	Own	Sel.	Eureka	Own	Own	Own	14	800	2800	2	2¼-3½	2¼	I. G.	Op.	.....	65
66	K	1½-Strom.	Ben.	Eise.	B. & B.	Own	Sel.	Own	Opt.	Hyatt	Hyatt	14	800	2900	.....	.....	3½	I. G.	In.	.....	66
67	K-D	1¾-King.	Ben.	K-W	Own	Own	Sel.	Eureka	Own	Own	Own	14	750	2700	2	1.8-2½	1.8	Ch.	Op.	.....	67
68	G-K-D	1½-Holl.	Ben.	Dixie	Own	Own	Sel.	Eureka	Own	Own	Own	14	750	2700	2	1.8-2½	1.8	Ch.	Op.	.....	68
69	G-K	1¼-Strom.	Ben.	Dixie	Bier.	Own	.....	S-J	Hyatt	Own	Own	12	900	2825	2	2½-5	2½	S. G.	In.	Yes	69
70	G-K	1½-Strom.	Ben.	Berl.	B. & B.	Own	Sl. G.	S-J	N. D.	N. D.	Opt.	14	700	2600	3	1¼-8	2¾	Worm	.....	Yes	70
71	G-K-D	1¼-King.	Ben.	Eise.	B. & B.	Spec.	Sl. G.	McCord	.....	Timk.	Timk.	8x12	995	2600	2	2¼-4	2¼	I. G.	In.	Yes	71
72	G	1½-Holl.	Ben.	Remy	B. & B.	Own	Sl. G.	Modine	Hyatt	.....	Hyatt	9	.....	.....	1	½-3	3½	G.	In.	.....	72
73	G-K-D	1½-King.	Ben.	K-W	M. & E.	Own	Sl. G.	Perfex	.....	.....	.....	16	600	2600	3	1½-3½	2¼	Ch.	.....	.....	73

Abbreviations: **Traction**—wh., wheel; Cr. crawler. **Engine**—Beav., Beaver; Veer., Veerac; Herc., Hercules; Wauk., Waukesha; Buff., Buffalo; Asso., Associated Manufacturers; Auto., Automatic; Weid., Weidely; Clim., Climax; Twin, Twin City; Cont., Continental; Ruten., Rutenber; Over., Overland; Kenn., Kenneth. **Cylinders**—Ver., vertical; Hor., horizontal; Opp., opposed. **Fuel**—G., gasoline; K., kerosene; D., distillate. **Carburetor**—Ray., Rayfield; King., Kingston; Holl., Holley; Scheb., Schebler; Ben., Bennett; Web., Webster; Zeph., Zephyr; Ens., Ensign; Strom., Stromberg; Till., Tillotson; Zen., Zenith; Car., Carter. **Air-Cleaner**—Donal., Donaldson; Ben., Bennett; Hol., Holley; Par., Parrett; Rain., Rainstrom. **Magneto**—A-K., Atwater-Kent; Sum., Sumter; Eise., Eiseman; Berl., Berling. **Clutch**—B. & B., Borg & Beck; Bier., Bierman; Mun., Muncie; Rock., Rockwood; Spec., special. **Gearset**—B. & S., Brown & Sharpe; Nutt., Nuttall. **Gearset type**—Sl. G., sliding gear; Sel. G., selective gear; Fr., friction; Plan., planetaary; Sl. J. C., sliding jaw clutch; Sl. Fr., sliding frame. **Final Drive**—S. G., spur gear; Ch., chain; D. R., double reduction; B. G., bull gear. **Drive**—Op., open; In., inclosed.

Motor Age Monthly Guide to Tractors

Line Number	Tractor and Model	Manufacturer	Drawbar horsepower	Belt horsepower	Number plows recommended	Size separator recommended	Pounds pull drawbar	Weight	Price	Traction	Diameter drive wheels	Make of engine	No. and type of cylinder	Bore and stroke	Normal R. P. M.
74	Oil-Gas, 18-36		18	36	4	30x46	.....	13500	.....	Wh.	64	Own	2 Hor.	8 x 10	400-450
75	Oil-Gas, 25-50	Nichols & Shepard Co., Battle Creek, Mich.	25	50	6	32x52	.....	19000	.....	Wh.	69	Own	2 Hor.	9 x 12	350-420
76	Oil-Gas, 35-70		35	70	8-10	40x60	.....	30000	.....	Wh.	73	Own	2 Hor.	10½ x 14	300-375
77	Oil-Pull		12	20	3	22x36	2150	6682	.....	Wh	51	Own	2 Hor	6 x 8	760
78	Oil-Pull	Advance-Rumely Thresher Co., Laporte, Ind.	16	30	4	28x44	2850	9600	.....	Wh.	56	Own	2 Hor.	7 x 8½	530
79	Oil-Pull		20	40	5-6	32x52	3750	12820	.....	Wh.	64	Own	2 Hor.	8 x 10	450
80	Oil-Pull		30	60	8-10	36x60	5900	26700	.....	Wh.	80	Own	2 Hor.	10 x 12	375
81	Oliver, B	Oliver Tractor Co., Knoxville, Tenn.	15	30	3-4	32	2800	7700	.....	.....	.....	Beav.	4 Ver.	4½ x 6	900
82	One-Man	Reed Fdy. & Mach. Co., Kalamazoo, Mich.	12	25	3	22x24	.....	5000	1,685	Wh.	60	Wauk.	4 Ver.	4½ x 5¾	1000
83	Parrett, H	Parrett Tractor Co., Chicago Heights, Ill.	12	25	3	.....	2800	5225	.....	Wh.	60	Buda	4 Ver.	4¼ x 5½	1000
84	Parrett, K		15	30	3	.....	.....	5250	1,950	Wh.	60	Own	4 Ver.	4½ x 6	1000
85	Peoria, J	Peoria Tractor Corp., Peoria, Ill.	12	25	3	26	3000	5100	1,985	Wh.	56	Clim.	4 Ver.	5 x 6½	800
86	Pioneer, 18-36	Pioneer Tractor Co., Winona, Minn.	18	36	4	28	4000	6100	.....	.....	60	Own	4 Hor.	5½ x 6	750
87	Pioneer, 30		30	60	10	36	8000	24000	.....	.....	96	Own	4 Hor.	7 x 8	650
88	Plow Man, 15-30	Plow Man Tractor Co., Waterloo, Ia.	15	30	3-4	30	3000	5100	1,995	Wh.	60	Buda	4 Ver.	4½x 6	1000
89	Port Huron, 12-25	Port Huron Eng. & T. Co., Port Huron, Mich.	12	25	3	22x38	2250	5900	1,700	Wh.	56	Chief	4 Ver.	4¾ x 6	900
90															
91	Post, D	Post Tractor Co., Cleveland, Ohio.	12	20	2	.....	.....	4300	.....	Wh.	32	Wauk.	4 Ver.	4¼ x 5¾	800
92	Russell, Junior		12	24	2	18	2000	6200	.....	Wh.	53	Wauk.	4 Ver.	4½ x 5¾	1000
93	Russell, Little Boss	Russell & Co., Massillon, Ohio.	15	30	3	24	3000	6900	.....	Wh.	53	Wauk.	4 Ver.	4½ x 6¾	950
94	Russell, Big Boss		20	35	4	30	4000	7600	.....	Wh.	60	Model	4 Ver.	5½ x 7	825
95	Russell, Giant		30	60	8	40	6000	24000	.....	Wh.	84	Own	4 Ver.	8 x 10	525
96	Samson, D	Samson Tractor Co., Janesville, Wis.	....	....	1	.....	.....	.....	630	Wh.	.....	.....	4 Ver.	.....	.....
97	Samson, M		....	....	2	20x32	.....	.....	840	Wh.	.....	.....	4 Ver.	.....	.....
98	Sandusky, J		10	20	3	22	2000	4080	1.)	Wh.	48	Own	4 Ver.	4¼ x 5¼	1050
99		Dauch Mfg. Co., Sandusky, Ohio.													
100	Sandusky, E		15	35	4	30	3000	7670	1,750	Wh.	56	Own	4 Ver.	5 x 6½	750
101	Shelby, D	Shelby Trac. & Tr. Co., Shelby, Ohio.	15	30	3	.....	.....	4600	.....	Wh.	48	Spec.	4 Ver.	4¾ x 6	900
102	Short Turn, D	Short Turn Tractor Co., Minneapolis, Minn.	20	40	3	24	.....	5000	1,500	Wh.	65	.....	4 Ver.	4¾ x 6	950
103															
104															
105	Simplicity	Turner Mfg. Co., Pt. Washington, Wis.	14	25	3	24	2600	4300	1,695	Wh.	54	Buda	4 Ver.	4¼ x 5½	1000
106	Square Turn, A	Square Turn Tractor Co., Norfolk, Nebr.	18	35	3	28	3200	7400	.....	.....	60	Clim.	4 Ver.	5 x 6½	850
107	Steel Mule	Bates Mach. & Trac. Co., Joliet, Ill.	15	22	3	26x36	.....	4600	.....	Cr.	.....	Erd	4 Ver.	4¼ x 6	900
108	Stinson, 4-E	Stinson Trac. Co., Superior, Wis.	18	36	4	28x30	.....	7100	2,250	Wh.	60	Beav.	4 Ver.	4¾ x 6	950
109	Tioga, 3	Tioga Mfg. Co., Philadelphia, Pa.	15	27	3-4	.....	.....	4950	.....	Wh.	36	Wis.	4 Ver.	4½ x 6	1000
110	Titan	International Harvester Co., Chicago.	10	20	3	.....	1800	5710	.....	Wh.	54	Own	2 Hor.	6½ x 8	575
111	Topp-Stewart, B	Topp-Stewart Trac. Co., Clintonville, Wis.	30	45	4-6	.....	7600	7500	3,500	Wh.	42	Wauk.	4 Ver.	4¾ x 6¾	900
112	Tracklayer, B	C. L. Best Gas Trac. Co., San Leandro, Calif.	12	25	3	.....	2000	5100	2,600	Cr.	.....	Own	4 Ver.	4½ x 5¼	850
113															
114	Tracklayer, A		35	60	9	.....	6500	17500	5,750	Cr.	.....	Own	4 Ver.	6½ x 3½	650
115															
116	Trundaar, 10	Buckeye Mfg. Co., Anderson, Ind.	25	40	4	.....	3750	8800	3,750	Ch. T.	.....	Wauk.	4 Ver.	5 x 6¼	900
117	Twin City, 12-20		12	20	3	20x24	2000	4200	.....	Wh.	50	Own	4 Ver.	4¼ x 6	1000
118	Twin City, 16-30		16	30	4	24x28	3000	7800	.....	Wh.	54	Own	4 Ver.	5 x 7½	650
119	Twin City, 25-45	Minneapolis Steel & Machinery Co., Minneapolis.	25	45	6	32x34	6700	16000	.....	Wh.	76	Own	4 Ver.	6¼ x 8	600
120	Twin City, 40-65	Minn.	40	65	8	40	7500	23700	.....	Wh.	84	Own	4 Ver.	7¼ x 9	535
121	Twin City, 60-90		60	90	12	40	11250	28000	.....	Wh.	84	Own	6 Ver.	7¼ x 9	535
122	Uncle Sam, B-19	U. S. Trac. & Machy. Co., Menasha, Wis.	20	30	3	28	3000	4250	.....	Wh.	50	Beav.	4 Ver.	4¾ x 6	900
123	Victory, 15-30	Victory Tractor Co., Greensburg, Ind.	15	30	3	28	2500	3450	1,750	Wh.	48	Wauk.	4 Ver.	4¼ x 5¾	900
124	Vim	Vim Tractor Co., Schleisingerville, Wis.	10	29	2-3	24	1800	3500	1,650	Wh.	48	Wauk.	4 Ver.	3¾ x 5¼	1050
125															
126	Wallis, K	J. I. Case Plow Works Co., Racine, Wis.	10	25	3	24x40	2600	3560	.....	Wh.	48	Own	4 Ver.	4¼ x 5¾	900
127	Waterloo Boy, N	Waterloo Gasoline Eng. Co., Waterloo, Ia.	12	25	3	.....	2000	5900	.....	Wh.	52	Own	2 Hor.	6½ x 7	750
128	Wetmore	Wetmore, H. A., Sioux City, Ia.	12	25	2-3	22	.....	2900	1,485	Wh.	46	Wauk.	4 Ver.	4 x 5¼	960
129	Wisconsin, E	Wisconsin Farm Trac. Co., Sauk City, Wis.	16	30	3-4	28	3500	5440	.....	Wh.	52	Clim.	4 Ver.	5 x 6½	800
130	Yuba, Ball Tread	Yuba Mfg. Co., Marysville, Calif.	12	20	3	.....	3500	7000	2,945	Cr.	.....	Wauk.	4 Ver.	4½ x 6¾	700
131	Yuba, Ball Tread		20	35	6-7	.....	6000	10100	4,892	Cr.	.....	Wis.	4 Ver.	5¾ x 7	700

One and Two-Horse Tractors

132	Avery, 5-10 B	Avery Co., Peoria, Ill.	5	10	2	22x32	900	2600	.....	Wh.	38	Own	4 Ver.	3 x 4	1200
133	General Purpose	Allis-Chalmers Mfg. Co., Milwaukee, Wis.	6	12	1-16	.....	1000	2500	795	Wh.	48	Le Roi	4 Ver.	3½ x 4½	1000
134	Heider, D	Rock Island Plow Co., Rock Island, Ill.	9	16	2	20	1500	4000	.....	Wh.	54	Wauk.	4 Ver.	4¼ x 5¾	1000
135															
136	Indiana	Indiana Silo Co., Anderson, Ind.	5	10	1	.....	900	2000	.....	Wh.	50	Le Roi	4 Ver.	3½ x 4½	950
137	International	International Harvester Co., Chicago.	8	16	2	.....	1350	3600	.....	Wh.	40	Own	4 Ver.	4¼ x 5	1000
138	La Crosse, M	La Crosse Trac. Co., La Crosse, Wis.	7	12	1-16	18	1000	2600	750	Wh.	48	Own	2 Hor.	4 x 6	1000
139	Shawnee	Shaw Enochs Trac. Co., Minneapolis, Minn.	9	18	2	22	2100	3800	.....	Wh.	48	Gray	4 Ver.	3½ x 5	1400
140	Shelby, C	Shelby Trac. & Tr. Co., Shelby, Ohio.	9	18	2	22	.....	3500	.....	Wh.	42	Wauk.	4 Ver.	3¾ x 5¼	1000
141	Traylor 6-12	Traylor Engrg. & Mfg. Co., Cornwells, Pa.	6	12	1	.....	.....	1700	815	Wh.	38	Le Roi	4 Ver.	3⅛ x 4½	1000
142	Victory, 9-18	Victory Tractor Co., Greensburg, Ind.	9	18	2	20	1500	3300	1,385	Wh.	48	Gray	4 Ver.	3½ x 5	1000

Abbreviations: Traction—wh. wheel; Cr. crawler. **Engine**—Beav., Beaver; Veer., Veerac; Herc., Hercules; Wauk., Waukesha; Buff., Buffalo; Asso., Associated Manufacturers; Auto., Automatic Weld. Weidely; Clim., Climax; Twin, Twin City; Cont., Continental; Ruten., Rutenber; Over., Overland; Kenn., Kenneth. **Cylinders**—Ver., vertical; Hor., horizontal; Opp., opposed. **Fuel**—G., gasoline; K., kerosene; D., distillate. **Carburetor**—Ray., Rayfield; King., Kingston; Holl., Holley; Scheb., Schebler; Ben., Bennett; Web., Webster; Zeph., Zephyr; Ens., Ensign, Strom., Stromberg; Till., Tillotson; Zen., Zenith; Car., Carter. **Air-Cleaner**—Donal., Donaldson; Ben., Bennett; Hol., Holley; Par., Parrett; Rain, Rainstrom. **Magneto**—A-K., Atwater-Kent; Sum., Sumter; Eise., Eiseman; Berl., Berling. **Clutch**—B. & B., Borg & Beck; Bier., Bierman; Mun., Muncie; Rock., Rockwood; Spec., special. **Gearset**—B. & S., Brown & Sharpe; Nutt., Nuttall. **Gearset type**—Sl. G., sliding gear; Sel. G., selective gear; Fr., friction; Plan., planetaary; Sl. J. C., sliding jaw clutch; Sl. Fr., sliding frame. **Final Drive**—S. G., spur gear; Ch., chain; D. R., double reduction; B. G., bull gear. **Drive**—Op., open; In., inclosed.

and Their Technical Specifications

Line Number	Fuel	Make and size of carburetor	Make of air cleaner	Make of magneto	Make of clutch	Make of gearset	Type of gearset	Make of radiator	Make of bearings in transmission	Make of bearings in front axle	Make of bearings in rear axle	Belt pulley diameter	Belt pulley R. P. M.	Belt speed F. P. M.	Speeds forward	Speed range M. P. H.	Recommended plowing speed	Final drive	Drive	Furrow wheel	Line Number
74	K	-King.	.....	Dixie	Own	Own	Sl. G.	Perfex	Own	Own	Own	8x22	.....	.....	2	1½-3	1½-3	S. G.	.....	.....	74
75	K	2½-King.	.....	Wied.	Own	Own	Sl. G.	Perfex.	Own	Own	Own	9x24	.....	.....	1	2.1	2.1	S. G.	.....	.....	75
76	K	3 -King.	.....	Wied.	Own	Own	Sl. G.	Perfex	Own	Own	Own	12x30	.....	.....	1	1.86	1.86	S. G.	.....	.....	76
77	K-D	2¼-Own	Donal.	Bosch	Own	Own	Sl. G.	Own	Own	Own	Hyatt	19	560	2790	2	2.1-3.26	2.1	S. G.	Op.	No	77
78	K-D	2½-Own	Donal.	Bosch	Own	Own	Sl. G.	Own	Own	Own	Hyatt	23	530	3190	2	2.1-3	2.1	S. G.	Op.	No	78
79	K-D	2¾-Own	Donal.	Bosch	Own	Own	Sl. G.	Own	Own	Own	Hyatt	26	459	3060	2	2-3.2	2	S. G.	Op.	No	79
80	K-D	3¼-Own	None	Bosch	Own	Own	Sl. G.	Own	Own	Own	Own	36	375	3540	1	1.9	1.9	S. G.	Op.	No	80
81	G-K	1½-Ben.	Ben.	Dixie	.....	Own	Sl. G.	Modine	Hyatt	.....	Hyatt	21½	2600	450	2	1¾-2½	2½	S. G.	.....	.....	81
82	G-K	1¼-Ben.	Ben.	Dixie	Bier.	Own	Sl. G.	Modine	Hyatt	.....	Hyatt	14½	2600	703	2½-3½	.....	2½	B. G.	In.	Yes	82
83	K	1¼ King.	Own	Eise.	Own	Own	Sl. G.	Perfex	.....	Hyatt	Hyatt	12	1000	3141	3	1.80-4	.....	I. G.	In.	.....	83
84	G-K	1½-King.	Own	Eise.	Own	Own	Sl. G.	Perfex	.....	Own	Own	12	1000	3100	2	2.6-4.07	2¾	S. G.	.....	Yes	84
85	K	1½-Strom	Ben.	Eise.	Own	Nutt.	Sl. G.	Eureka	Hyatt	.....	.....	14	650	2500	2	2½-4	2½	I. G.	.....	Yes	85
86	G-K	1½-King.	Ben.	K-W	Own	Own	.....	S-J	Timk.	Timk.	Timk.	14	750	.....	3	1¾-4	2½	S. G.	.....	.....	86
87	G-K	2 -King.	Ben.	K-W	Own	Own	Sl. G.	S-J	Own	Own	Own	17½	650	.....	3	1¾-4¼	2½	.....	.....	.....	87
88	G-K	1¼-Strom.	.....	Dixie	Own	Foote	Sl. G.	Perfex	Hvatt	Hyatt	Hyatt	14	590	2200	2	2-3	.....	I. G.	Op.	.....	88
89	G-K	1½-King.	Own	Eise.	Own	Own	.....	Bremer	S. K. F.	Plain	Plain	14	650-1065	2380-3900	7	1⅞-4	2	S. G.	In.	Yes	89
90																					90
91	G-K	-King.	Ben.	Split.	Own	Own	.....	Perfex	Opt.	Timk.	Timk.	14	2500	.....	2	3-3	3	G	.....	Yes	91
92	K	1¼-King.	Ben.	Bosch	Own	Cotta	Sl. G.	.....	.....	.....	.....	12½	915	3000	3	1½-3¾	2¼	S. G.	Op.	.....	92
93	K	1¼-King.	Ben.	Dixie	Own	Cotta	Sl. G.	.....	.....	.....	.....	12½	810	2850	3	1½-3¾	2¼	S. G.	Op.	.....	93
94	K	1½-King.	Ben.	Dixie	Own	Own	Sl. G.	.....	.....	.....	.....	12½	840	2749	2	2.4-3¾	2.4	S. G.	Op.	.....	94
95	K	2 -King.	Ben.	Bosch	Own	Own	Sl. G.	.....	.....	.....	.....	24	525	3310	2	2-4½	2	S. G.	Op.	.....	95
96	G	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	96
97	G	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18	375	.....	2	.....	.....	.....	.....	.....	97
98	G K-D	1¼-King.	Ben.	Dixie	Own	Own	Sel.	Perfex	Hyatt N. D.	Own	Own	10	1000	2600	2	2-3	2	I. G.	Op.	Yes	98
99																					99
100	G-K-D	2 -King.	Ben.	Dixie	Own	Own	Sel.	C. & P.	Own	Own	Own	15	800	2950	3	2-5½	2	I. G.	Op.	No	100
101	G-K	-King.	Ben.	Dixie	Own	Foote	Sl. G.	Modine	Hyatt	Timk.	Hyatt	14	650	.....	2	2½-3½	3	I. G.	In.	Yes	101
102	G-K	1½-Opt.	Opt.	Dixie	.....	Own	Sel.	Splitex	Own	Own	Own	18	950	.....	2	2-3	2½-3	I. G.	.....	Yes	102
103													700								103
104													490								104
105	G-K	1¼-King.	Ben.	Dixie	Own	Own	.....	Perfex	Hyatt	Own	Own	14	600	600	2-2½	1¾-3	2½	.....	.....	Yes	105
106	G-K	1½-Strom.	Ben.	Dixie	.....	Own	.....	Modine	Hyatt	Hyatt	Hyatt	12	850	2669	1	2½	2½	I. G.	.....	Yes	106
107	G-K-D	1¼-Ben.	Ben.	Dixie	B. & B.	Own	Sl. G.	Modine	Timk.	Timk.	Timk.	12	750	2300	2	2.33-3.5	2.33	S. G.	.....	.....	107
108	K	1½-King.	Rain.	Dixie	Own	Own	Sl. G.	Todd	Hyatt	Hyatt	Own	12	950	2985	1	2½-3	3	S. G.	In.	Yes	108
109	G	1¼-Strom.	Ben.	Split.	Twin	Own	Sel.	G. & O.	Gurney	Timk.	Opt.	12	.....	.....	2	2.7-3.7	2.7	G.	In.	No	109
110	G-K-D	-Own	.....	K-W	Own	.....	Sl. G.	.....	Own	Own	.....	18	575	.....	.....	2¼-2¾	2⅞	Ch.	.....	.....	110
111	G	1½-Strom.	Ben.	Ei e.	B. & B.	Own	Sel.	Bremer	Hyatt	N. D.	N. D.	12	900	2600	3	1¾-4½	2½	I. G.	.....	.....	111
112	D	1½-Ens.	Ben.	Split.	Own	Own	Sl. G.	Own	Hyatt Timk.	.....	Hyatt	9	9000	1971	2	2¼-3	3	I. G.	.....	.....	112
113																					113
114	D	2 -Ens.	Ben.	Bosch	Own	Own	Sl. G.	Own	Hyatt Timk.	.....	Timk.	16	650	2720	2	3-2	3	I. G.	.....	.....	114
115																					115
116	G-K-D	-Strom.	Own	Bosch	Hill.	Own	Sl. G.	Modine	Opt.	.....	H. & T.	.....	900	2600	2	1.3-2.5	.....	S. G.	In.	.....	116
117	G-D	1¼-Holl.	Ben.	Bosch	B. & B.	Own	Sl. G.	Modine	Hyatt	Own	Hyatt	16	650	2700	2	2.2-2.9	2.9	S. G.	In.	Yes	117
118	G-K	1½-Holl.	Ben.	K-W	Own	Own	Sl. G.	Modine	Hyatt	Own	Hyatt	17	528	2350	2	2-2.75	2¾	S. G.	In.	.....	118
119	G-K	2 -King.	.....	K-W	Own	Own	Sl. G.	Own	Own	Own	Own	20	600	3150	2	1.4-2	2	S. G.	Op.	.....	119
120	G-K	2½-King.	.....	K-W	Own	Own	Sl. G.	Own	Own	Own	Own	23	535	200	1	2	2	G.	Op.	.....	120
121	G-K	3 -King.	.....	K-W	Own	Own	Sl. G.	Own	Own	Own	Own	23	535	3200	1	2	2	S.	Op.	.....	121
122	K	1½-Ben.	Ben.	Dixie	Twin	Nutt.	Sl. G.	Perfex	Timk.	Timk.	Timk.	11	900	2600	2.6-3.8	2-4	2.6	S. G.	In.	Yes	122
123	G	1¼-Ben.	Ben.	Berl.	B. & B.	Own	Sl. G.	James.	Schatz	Hyatt	Opt.	10	800	2600	2	1¾-4	2½	S. G.	.....	.....	123
124	G-K	-Ben.	Par.	Simms.	B. & B.	Own	S. G.	B. & W.	Gurney	Gurney Hyatt	Hyatt	10	1050	2300	2	2½-3½	2½	I. G.	In.	Yes	124
125																					25
126	G-K-D	1¼-Ben.	Ben.	Berl.	Twin	Own	Sl. G.	Modine	Timk.	Hyatt	Timk.	18	430	.....	2	1½-3½	2½-3½	S. G.	.....	.....	126
127	K	1½-Scheb.	.....	Dixie	Own	Own	Sl. G.	Modine	Hyatt	.....	Hyatt	14	750	2750	2½-3	2¼-3	2¼-3	I. G.	Opt.	Yes	127
128	G	1¼-Scheb.	.....	Split.	Full.	Fuller	S. G.	Ideal	.....	.....	Timk.	12	900	.....	3	2-5	3½	I. G.	In.	Yes	128
129	K	1½-Strom	Ben.	Eise.	B. & B.	Fo te	S. G.	Perfex	Hyatt	.....	.....	16	600	2600	2	1½-4	2½	S. G	In.	.....	129
130	D	1¼-Ens.	Donald.	Bosch	B. & B.	Own	S. G.	Own	Hyatt	.....	Hyatt	12	700	2200	3	1.5-4	2.08	B. P.	.....	.....	130
131	D	-Strom.	Donald.	Bosch	Para.	Own	S. G.	Own	Hyatt	.....	Hyatt	10-14	700	1835	2	2.06-3.28	2.06	I. G.	.....	.....	131

One and Two-Horse Tractors

132	G-K	¾-King.	Ben.	K-W	Own	Own	Sl. G.	Own	Hyatt	Own	Own	10	780	2450	3	1½-4¼	2½	S. G.	Op.	.....	132
133	G	⅞-King.	Ben.	.....	B. & B.	Own	Sl. G.	Own	Gurney	Own	Own	10	1000	2600	1	1½-2.4	2.4	.....	.....	Yes	133
134	G-K	1 -King.	Ben	Dixie	Own	.....	Fr.	Perfex	U. S.	.....	Own	12	400-1000	2200	7	1-5	1¼	B. G.	Op.	Yes	134
135																					135
136	K	⅞-King.	Ben.	A-K	Own	Own	Sl. G.	Cand.	.....	.....	.....	.....	1200	.....	1¼-4	.....	.....	Ch.	Op.	.....	136
137	G-K-D	-Ens.	.....	Dixie	Own	.....	Sl. G.	B. & L.	Own	Own	.....	12¼	625	.....	.....	1¾-4.1	2¾	Ch.	.....	.....	137
138	K	1¼-King.	Ben.	.....	Own	Own	Own	Hopper	.....	Own	Own	10	1000	2600	1	1¾-2½	2½	.....	.....	Yes	138
139	G	1 -Scheb.	Ben.	Berl.	B. & B.	Own	.....	Todd	Fafnir	.....	Hyatt	8	.....	2600	2	1¾-2.4	2.4	.....	In.	Yes	139
140	G	1 -King.	Ben.	Dixie	Full.	Full.	Sl. G.	Modine	.....	Timk.	Timk.	10	850	2200	3	1¾-4¼	.....	I. G	In.	.....	140
141	G	-King.	Own	Dixie	B. & B	Own	Sl. G.	G. & O.	Own	Own	.....		1200	1000	1	3½-5	3½	B. G.	.....	.....	141
142	G	1 -Car.	Ben.	Berl.	B. & B.	Own	Sl. G.	James.	Schatz	Hyatt	Opt.		820	2650	2	1¾-4¼	2½	S. G.	.....	.....	142

Abbreviations: **Traction**—wh., wheel; Cr. crawler. **Engine**—Bear., Bearer; Veer., Vecrac; Herc., Hercules; Wauk., Waukesha; Buff., Buffalo; Asso., Associated Manufacturers; Auto., Automatic; Weld., Weldely; Clim., Climax; Twin, Twin City; Cont., Continental; Ruten., Rutenber; Over., Overland; Kenn., Kenneth. **Cylinders**—Ver., vertical; Hor., horizontal; Opp., opposed. **Fuel**—G., gasoline; K., kerosene; D., distillate. **Carburetor**—Ray., Rayfield; King., Kingston; Holl., Holley; Scheb., Schebler; Ben., Bennett; Web., Webster; Zeph., Zephyr; Ens., Ensign; Strom., Stromberg; Till., Tillotson; Zen., Zenith; Car., Carter. **Air-Cleaner**—Donal., Donaldson; Ben., Bennett; Hol., Holley; Par., Parrett; Rain. Rainstrom. **Magneto**—A-K., Atwater-Kent; Sum., Sumter; Eise., Eiseman; Berl., Berling. **Clutch**—B. & B., Borg & Beck; Bier., Bierman; Mun., Muncie; Rock., Rockwood; Spec., special. **Gearset**—B. & S., Brown & Sharpe; Nutt., Nuttall. **Gearset type**—Sl. G., sliding gear; Sel. G., selective gear; Fr., friction; Plan., planetary; Sl. J. C., sliding jaw clutch; Sl. Fr., sliding frame. **Final Drive**—S. G., spur gear; Ch., chain; D. R., double reduction; B. G., bull gear. **Drive**—Op., open; In., inclosed.

Motor Age Monthly Guide to Tractors

Orchard Tractors

Line Number	Tractor and Model	Manufacturer	Drawbar horsepower	Belt horsepower	Number plows recommended	Size separator recommended	Pounds pull drawbar	Weight	Price	Traction	Diameter drive wheels	Make of engine	No. and type of cylinder	Bore and stroke	Normal R. P. M.
143	Allwork	Electric Wheel Co., Quincy, Ill.													
144	Avery, 6-cyl	Avery Co., Peoria, Ill.				22x32		3164		Wh.	38	Own	6 Ver.	3 x 4	1200
145	Cletrac, W	Cleveland Trac. Co., Cleveland, Ohio	12	20	2	24x40	1500	3400	1,395	Cr.		Own	4 Ver.	4 x 5½	1265
146	Fageol, D	Fageol Motors Co., Oakland, Calif.	9	12	2		1450	3500	1,525		48	Lyc.	4 Ver.	3½ x 5	1250
147	Fordson	Ford Motor Co., Highland Park, Mich.		20	2	20x34	1800	2700	850	Wh.	42	Own	4 Ver.	4 x 5	1000
148															
149	International, 8-16	International Harvester Co., Chicago	8	16	2		1350	3600		Wh.	40	Own	4 Ver.	4¼ x 5	1000
150	Moline Orchard	Moline Plow Co., Moline, Ill.	9	18	2	24	2000	3380		Wh.	44	Own	4 Ver.	3½ x 5	
151	Stockton, A	Stockton Trac. Co., Stockton, Calif.	8	16	2-3	20x34	1850	3150	1,225	Wh.	44	H-S	4 Ver.	3½ x 5	

Garden Tractors

152	Beeman, G	Beeman Tractor Co., Minneapolis, Minn.	2	4	1-7		260	550	310	Wh.	25	Own	1 Ver.	3¼ x 4½	850
153	Do-It-All	Consolidated G. & Gas Eng. Co., New York	3	6	1			1000	495		24	Own	1 Ver.	4½ x 5	900
154	Market	Market Garden Trac. Co., Minneapolis, Minn.	2	4½	1-7			550			24	Veer.	1 Hor.	4 x 4	850
155	Merry Garden	Atlantic Mach. Mfg. Co., Cleveland, Ohio		2				250	195		20		1 Ver.	2¾ x 2½	900
156	New Britain, 1	New Britain Mch. Co., New Britain, Conn	3	6	1-9		400	700	450	Wh.	26½	Own	2 Ver.	2¾ x 4	1500
157	New Britain, 2		3	6	1-9		400	750	500	Wh.	32	Own	2 Ver.	2¾ x 4	1500
158	Oldsmar	Oldsmar Tractor Co., Oldsmar, Fla.	1-3	5	1		150-450	1200	375	Wh.	32	Evin.	1 Ver.	5 x 5½	580
159	Princess Pat	Scientific Farming Mchy., Minneapolis, Minn.			2	24x26	2000	3500	1,750	Wh.	46	Buda	4 Ver.	4¼ x 5½	1000
160	Tillermobile, A	Tillermobile Co., Minneapolis, Minn.	2	6	1-8			625	385	Wh.	30	Veer.	1 Ver.	4 x 4	1200
161	Universal, 20	Elderfield Mechanics Co., Pt. Washington, N. Y.	1	4	1		250	750	485		30	Own	1 Ver.	3½ x 5	1000
162	Utililitor	Midwest Engine Co., Indianapolis, Ind.	1½	3½	1		150-200	750	380	Wh.	24¾	Own	1 Ver.	3½ x 4½	1200

Motor Cultivators

163	Avery, Single Row	Avery Co., Peoria, Ill.	5	10			900	2650		Wh	42	Own	4 Ver.	3 x 4	1200
164	Avery, C							3450		Wh.	42	Own	6 Ver.	3 x	1200
165	Bailor, A	Bailor Plow Mfg. Co., Atchison, Kan.	6					2150	925	Wh.	44	Le Roi	4 Ver.	3⅛ x 4½	1000
166	Bailor, W		6					1800	775	Wh.	40	Le Roi	4 Ver.	3⅛ x 4½	1000
167	Detroit Culto, AA	Detroit Culto-Tractor Corp., Detroit	9	16	2	20x28	1600	1800	775	Wh.	42	Own	2 Ver.	4 x 6	400
168	E-B	Emmerson-Brantingham Co., Rockford, Ill.			None			3200		Wh.	42	Le Roi	4 Ver.	3⅛ x 4½	100
169	Heider, 10	Rock Island Plow Co., Rock Island, Ill.	6	10	1			2700		Wh.	46	Le Roi	4 Ver.	3⅛ x 4½	
170	Parrett, J	Barrett Motor Corp., Chicago	6	12	2	None		3000	890	Wh.	44	Le Roi	4 Ver.	3⅛ x 4½	1000
171	Shawnee	Shaw Eno hs Trac. Co., Minneapol's, Minn.	6	12	1		1100	2600		Wh.	48	Le Roi	4 Ver.	3⅛ x 4½	1400
172	Toro	Toro Motor Co., Minneapo is, Minn.	6				1100	2800	950	Wh.	42	Le Roi	4 Ver.	3⅛ x 4½	1200

Abbreviations: **Traction**—wh., wheel; Cr. crawler. **Engine**—Beav., Beaver; Veer., Veerac; Herc., Hercules; Wauk., Waukesha; Buff., Buffalo; Asso., Associated Manufacturers; Auto., Automatic; Weid., Weidely; Clim., Climax; Twin, Twin City; Cont., Continental; Ruten., Rutenber; Over., Overland; Kenn., Kenneth. **Cylinders**—Ver., vertical; Hor., horizontal; Opp., opposed. **Fuel**—G., gasoline; K., kerosene; D., distillate. **Carburetor**—Ray., Rayfield; King., Kingston; Holl., Holley; Scheb., Schebler; Ben., Bennett; Web., Webster; Zeph., Zephyr; Ens., Ensign; Strom., Stromberg; Till., Tillotson; Zen., Zenith; Car., Carter. **Air-Cleaner**—Donal., Donaldson; Ben., Bennett; Hol., Holley; Par., Parrett; Rain, Rainstrom. **Magneto**—A-K., Atwater-Kent; Sum., Sumter; Eise., Eiseman; Berl., Berling. **Clutch**—B. & B., Borg & Beck; Bier., Bierman; Mun., Muncie; Rock., Rockwood; Spec., special. **Gearset**—B. & S., Brown & Sharpe; Nutt., Nuttall. **Gearset type**—Sl. G., sliding gear; Sel. G., selective gear; Fr., friction; Plan., planetaary; Sl. J. C., sliding jaw clutch; Sl. Fr., sliding frame. **Final Drive**—S. G., spur gear; Ch., chain; D. R., double reduction; B. G., bull gear. **Drive**—Op., open; In., inclosed.

MOTOR BUS TRANSPORTATION

(*Continued from page 17*)

in the aisles and the general rule is to take on as many passengers as can be squeezed into the body or carried on the runningboard. The buses are not washed and kept clean and no attempt is made to uniform the drivers, some of whom wear no collars and in other ways do not present a pleasing appearance or one suggesting permanency of the service.

All these incidentals of the present system have been overlooked due to the existing emergency but will be eliminated in the third and final steps in bus development which at this time appears to be toward the use of larger and better equipped buses. Already many of this newer type of bus are in operation and their use to a greater extent depends only upon the decision as to whether the owner of such equipment can be protected in his investment by a decision on the part of the public as to whether they want bus transportation or trolley transportation or some combination of the two. While it is doubtful if this superior and ultimate bus service can be rendered for a 5-cent fare, the handwriting on the wall seems to point to the choice of the motor bus, since before Bridgeport's trolleys ceased running, the buses carried approximately 60 per cent of the city's riders.

ACCESSORIES COMPANY GROWS

Wilkes-Barre, Pa., Aug. 20—Plans for the expansion of the American Auto Accessories Stores Corp., which includes the purchase of another established automobile store in this city and the opening of stores in two other large cities of Pennsylvania, were made at a conference held by Charles Weissman and the managers of the corporation establishments located in other cities throughout the state. It was intimated that negotiations are being made for the purchase of a centrally located automobile business here within the next few weeks.

PACKARD STATION AT JACKSON

Jackson, Mich., Aug. 20—A permit for the erection of a service station to cost $21,000 has been granted W. J. Dowsett, who will erect a service station for the Packard Motor Car Co. The building will be 82 by 88 ft. of steel and concrete and will be built back 44 ft. from the street, leaving space for the erection of a sales room. The building will be erected according to plans furnished by the Packard Motor Car Co.

TO SING ON TRUCK TOUR

Cincinnati, O., Aug. 23—Community singing, under the direction of an assistant to the community song director of the Cincinnati parks, will be one of the features of the 235-mile truck tour to be made through Northern Kentucky during the week beginning August 30 by the members of the Cincinnati Truck Dealers association. The singing is designed to put the farmers en route in a receptive mood for the truck talks that will be made.

and Their Technical Specifications

Orchard Tractors

Line Number	Fue	Make and size of carburetor	Make of air cleaner	Make of magneto	Make of clutch	Make of gearset	Type of gearset	Make of radiator	Make of bearings in transmission	Make of bearings in front axle	Make of bearings in rear axle	Belt pulley diameter	Belt pulley R. P. M.	Belt speed F. P. M.	Speeds forward	Speed range M. P. H.	Recommended plowing speed	Final drive	Drive	Furrow wheel	Line Number
143																					143
144	G-K	¾-King.	Ben.	K-W	Own	Own	Sl. G.	Own	Hyatt	Own	Hyatt	10	780	2450	3	1½-4¼	2½	S. G.	Op.	.....	144
145	G-K-D	1⅛-King.	Own	Teagle	Own	Own	Sl. G.	McCord	.....	Timk.	Timk.	8	1265	2500	1	1-3½	3	I. G.	In.	.....	145
146	G-K-D	1 -Zen.	Own	Dixie	Own	Own	C. M.	Modine	Timk.	Timk.	Timk.	8	1250	2600	1	¾-3	2½	S. G.	.....	.....	146
147	K	-Holl.	Own	Own	Own	Own	Sel.	Own	Gurney S. R. B.	Timk.	Gurney S. R. B.	9½	1000	2480	3	1-8	2¾	Worm	In.	.....	147
148																					148
149	G-K-D	-Ens.	.....	Dixie	Own	.....	Sl. G.	B. & L.	Own	Own	.....	12¼	625	.....	.....	1¾-4.1	2⅜	Ch.	.....	.....	149
150	G	1½-Holl.	Ben.	Remy	B. & B.	Own	Sl. G.	Modine	Hyatt	.....	Hyatt	9	.....	.....	1	½-3	3½	G.	In.	.....	150
151	G-D	1 -King.	Ben.	Berl.	Own	Own	Sl. G.	Modine	Hyatt	Own	Hyatt	12	400	.....	2	2½-3½	2½	G.	In.	No	151

Garden Tractors

152	G	¾-King.	Donald.	Heinze	Own	Own	.....	S-J	.....	None	None	4½	850	900	1	¾-3	2	G.	.....	Yes	152
153	G	1 -Holl.	Donald.	Berl.	Own	Own	.....	Own	Own	Own	.....	6	.....	.....	1	1-3	2½	.....	.....	.....	153
154	G	1 -Scheb.	Ben.	Berl.	Own	Own	Spec.	.....	Hess-B.	Timk.	.....	6	2000	.....	1	1½-2½	2½	Worm	.....	.....	154
155	G	.....	.....	Evin.	Own	Own	Sl. G.	.....	Own	.....	Own	6	200	.....	1	1¾-2¼	.....	S. G.	.....	.....	155
156	G	¾-King.	Ben.	Dixie	Own	Own	.....	G. & O.	Own	.....	.....	5½	1500	2160	1	1-3	.....	B. G.	In.	.....	156
157	G	¾-King.	Ben.	Dixie	Own	Own	.....	G. & O.	Own	.....	.....	5½	1500	2160	1	1-3	.....	B. G.	In.	.....	157
158	G	1 -Scheb.	Own	Opt.	Own	.....	.....	None	Own	.....	.....	5	580	240	2½	.....	2½	.....	.....	.....	158
159	K	1¼-Ben.	Martain	Dixie	B. & B.	Own	Sl. G.	S-J	Hyatt	Hyatt	Hyatt	12	1000	3100	2	2½-4½	2½	I. G.	In.	Yes	159
160	G-K	-Veer.	Own	Berl.	Own	Own	D. R.	.....	.....	.....	.....	11	.....	.....	1	1-3	2½	B. G.	.....	.....	160
161	G	⅞-Zen.	.....	Bosch	Own	Own	.....	Main	.....	.....	.....	6	1000	.....	1	1-3	2	Worm	.....	.....	161
162	G	¾-King.	Own	Eise.	Own	Own	.....	Modine	.....	.....	.....	4½	1200	1200	1	1-4	2¼	I. G.	In.	.....	162

Motor Cultivators

163	G-K	¾-King.	Ben.	K-W	Own	Own	Sl. G...	Own	Hyatt	Own	Hyatt	10	780	2450	3	1⅝-4⅜	2½	S. G.	Op.	.....	163
164	G-K	¾-King.	Ben.	K-W	Own	Own	Sl. G.	Own	Hyatt	Own	Own	10	780	2450	3	1⅝-4¼	2½	S. G.	Op.	.....	164
165	G	⅞-King.	Ben.	Dixie	B. & B.	.....	.....	Perfex	.....	Hyatt	Hyatt	12	.....	.....	2	2½-3.7	.....	Ch.	.....	.....	165
166	G	⅞-King.	Ben.	Dixie	B. & B.	.....	.....	Perfex	.....	Hyatt	Hyatt	.....	.....	.....	2	2½-3.7	.....	Ch.	.....	.....	166
167	G	1¼-Strom.	Own	Bosch	Own	Own	Sl. G.	Own	Hyatt	Own	Own	8	885	1800	2	1-3	2⅛	B. G.	In.	.....	167
168	G	-Holl.	Ben.	Dixie	Own	None	None	Perfex	Hyatt	Own	Hyatt	7⅛	995	.....	1-5	1½-3½	None	.....	.....	.....	168
169	G	⅞-King.	Ben.	Dixie	.....	.....	.....	Perfex	Opt.	.....	.....	.....	.....	.....	.....	1½-3½	.....	B. G.	Op.	.....	169
170	G	¾-King.	Own	Eise.	B. & B.	Own	Sel.	Modine	S. K. F.	Hyatt	Hyatt	6	1000	.....	2	1.3-3.5	.....	I. G.	.....	No	170
171	G	1 -Scheb.	Ben.	Berl.	B. & B.	Own	.....	Todd	Fafnir	.....	Hyatt	8	.....	2600	2	1¾-2.9	2.9	Worm	In.	Yes	171
172	G	⅞-King.	Ben.	Eise.	Own	Own	Sl. G.	B. & W.	Opt.	.....	Hyatt	8	1200	2400	2	1-3½	2.7	B. G.	In.	.....	172

Abbreviations: Traction—wh., wheel; Cr. crawler. **Engine**—Beav., Beaver; Veer., Veerac; Herc., Hercules; Wauk., Waukesha; Buff., Buffalo; Asso., Associated Manufacturers; Auto., Automatic; Weid., Weidely; Clim., Climax; Twin, Twin City; Cont., Continental; Ruten., Rutenber; Over., Overland; Kenn., Kenneth. **Cylinders**—Ver., vertical; Hor., horizontal; Opp., opposed. **Fuel**—G., gasoline; K., kerosene; D. distillate. **Carburetor**—Ray., Rayfield; King., Kingston; Holl., Holley; Scheb., Schebler; Ben., Bennett; Web., Webster; Zeph., Zephyr; Ens., Ensign; Strom., Stromberg; Till., Tillotson; Zen., Zenith; Car., Carter. **Air-Cleaner**—Donal., Donaldson; Ben., Bennett; Hol., Holley; Par., Parrett; Rain, Rainstrom. **Magneto**—A-K., Atwater-Kent; Sum., Sumter; Eise., Eiseman; Berl., Berling. **Clutch**—B. & B., Borg & Beck; Bier., Bierman; Mun., Muncie; Rock., Rockwood; Spec., special. **Gearset**—B. & S., Brown & Sharpe; Nutt., Nuttall. **Gearset type**—Sl. G., sliding gear; Sel. G., selective gear; Fr., friction; Plan., planetaary; Sl. J. C., sliding jaw clutch; Sl. Fr., sliding frame. **Final Drive**—S. G., spur gear; Ch., chain; D. R., double reduction; B. G., bull gear. **Drive**—Op., open; In., inclosed.

SALES CAMPAIGN FOR HAMILTON

Grand Haven, Mich., Aug. 20—Inaugurating an intensive sales campaign in which district managers will be located in every section of the country. Hamilton Motors Co. has announced the appointment of D. C. McIntire in Pacific coast territory and W. E. Kalaman who will have charge of the Kansas City zone. Mr. McIntire, whose headquarters will be in 'Frisco, formerly was connected with the transportation engineering department of the Four Wheel Drive Truck Co. Mr. Kalaman formerly was with Harley Davidson.

NOT HOLMES AUTOMOBILE CO.

The Holmes Automobile Co., Canton, Ohio, is a different organization from the Holmes Manufacturing Co. against whom a temporary injunction has been issued relative to the manufacture and sale of certain products of the Cameron Motors Corp. The automobile company is not concerned in the suit.

TROUBLE BETWEEN DEALERS AND COUNTY FAIR OFFICIALS

Lancaster, Pa., Aug. 6—Claiming that they have been discriminated against and are not being given a square deal by the Lancaster County Fair association, upwards of fifty members of the Lancaster Automobile Trade association are up in arms in this chief farming region of the state. The trouble has arisen over the ruling that automobile exhibitors this year shall pay $2 per foot for frontage in exhibiting at the fair.

MERTZANOFF WITH SIMMS MOTORS

Atlanta, Ga., Aug. 21—C. E. Mertzanoff, formerly manager of the export department for the Mitchell Motor Co., has been appointed export manager for the Simms Motor Car Corp., a company recently organized in Atlanta which will erect a large factory here for the manufacture of a popular priced car. Mr. Mertzanoff has returned to New York, where his new office is located.

TO EXTEND CHAIN OF GARAGES

Holland, Mich., Aug. 20.—Holleman Deweerd Auto Co. has placed $40,000 worth of stock on the market, $32,000 of which is preferred and $8,000 common. The par value is $10 and the shares will be sold in blocks of ten. The company was incorporated at Holland, Mich., for the purpose of establishing a chain of garages in upper Michigan and now has five operating. The success attending the initial efforts prompted the decision to put this stock on the market for the purpose of securing capital to extend the chain. According to the statement accompanying the issue, the company's books show sales for 1919 of approximately $221,000, with a net profit of approximately $13,000. Net profits for the first six months of 1920 were approximately $11,000.

The company delivered 200 Fords and 18 tractors in 1919 and has delivered 181 cars and 10 tractors thus far this year.

From the Four Winds

Glimpses at the World of Motordom

Coming Motor Events

AUTOMOBILE SHOWS

Des Moines, Ia.	Annual Fall Show	Aug. 25-Sept. 6
Toronto, Exhibition City	National Automobile Show	Aug. 28-Sept. 11
Milwaukee	Annual Fall Automobile Show	Aug. 30-Sept. 4
Sacramento, Cal.	Annual Show	Sept. 4-12
Indianapolis	Fall Automobile Show	Sept. 6-11
Cincinnati	Annual Passenger Car Show	Sept. 18-25
Buffalo	Closed Car Show	Sept. 27-Oct. 2
Northampton, Mass.	Annual Automobile Show	Oct. 6-8
Jersey City, N. J.	Annual Automobile Show	Nov. 1-6
New York	Automobile Salon	Nov. 14-21
Chicago	Automotive Equipment Show	Nov. 15-20
New York	National Passenger Car Show	Jan. 8-15, 1921
Chicago	National Passenger Car Show	Jan. 29-Feb. 4, 1921

TRACTOR SHOWS

Los Angeles, Cal.	National Tractor and Implement Show of the West	Sept. 20-26
Columbus, O.	National Tractor Show	Feb. 6-12, 1921

FOREIGN SHOWS

London	Commercial Vehicles, Exhibition, Olympia	October
London	Passenger Car Show, Olympia	November

RACES

Paris, France	Grand Prix Race, Sporting Commission	August
Buffalo, N. Y.	Dirt Track	Aug. 14
Elgin, Ill.	Road Race	Aug. 21
Johnstown City, Pa.	Dirt Track	Aug. 21
Middletown, N. Y.	Dirt Track	Aug. 20-21
Flemington, N. J.	Dirt Track	Aug. 27-28
Canandaigua, N. Y.	Dirt Track	Aug. 28
Hornell, N. Y.	Dirt Track	Sept. 6
Uniontown, Pa.	Speedway Race	Sept. 6
Syracuse, N. Y.	Dirt Track	Sept. 17-18
Allentown, Pa.	Dirt Track	Sept.
Los Angeles, Cal.	Speedway Race	Nov. 25

TOURS

Milwaukee, Wis.	Annual Fall Automobile Show	Aug. 30-Sept. 4
Detroit	Good Roads Assn. Tour	July 14-20

CONVENTIONS

Cincinnati	Ohio Automobile Trade Assn. Fourth Annual Convention	Dec. 8-10
Atlantic City	National Implement and Vehicle Ass'n. Twenty-seventh Annual Convention	Oct. 20, 21, 22

Personal

W. J. Jones, works manager of the J. I. Case Plow Works Co., Racine, Wis., has been elected a vice-president of the company in charge of production.

W. E. Hobbie, former assistant manager of the Oakland branch at Omaha has been made manager of the Oakland branch house at Des Moines. Mr. Hobbie has been in the motor car business for fourteen years. He succeeds H. E. Mahhaffey.

Harry M. Barton, until recenty assistant manager of the Ford branch at Des Moines, has resigned and purchased the Ford agency at Burlington, Iowa, from the Gamble Waggoner Co. Mr. Barton has been with the Ford Motor Co. since 1913 when he started as office manager of the branch at Cambridge, Mass. In 1916 he came to Des Moines as assistant manager and remained here until 1918 when he went to Detroit as manager of the Holly Carburetor plant. In August, 1919, he returned to Des Moines as assistant branch manager.

George M. Graham has been elected vice-president of the Pierce-Arrow Motor Car Co., succeeding W. J. Foss, who resigned July 1 wishing to be relieved from active business. Mr. Graham went to the Pierce-Arrow company from the Willys-Overland Co., and during his four years at Buffalo has successively been assistant commercial manager and general sales manager. During the war he was chairman of the national motor truck committee at Washington, representing the entire motor truck industry in all of its activities that centered there.

W. C. Morgan, formerly connected with General Motors, the Acme Motor Truck Co. and the Simplex Wheel Co., has been appointed chief inspector of the Transport Truck Co., Mount Pleasant, Mich. Ludwig Arnson has been named special factory representative and W. A. Nielson and Glenn Rockwell have joined the sales force of the organization.

Business

The new service building of the Ace Hurd Tire & Service Co. in Kansas City, was opened for business last week. It has a complete accessory department, repair and storage division and battery service station. A free night and day road service is a feature of the new station.

J. Stanley Clemence has resigned as sales manager for the Northwestern Auto Supply Co., Pocatello, Idaho.

The Bardeen Motor Sales Co., Kansas City, has obtained the agency for the Moon Motor car for western Missouri and Kansas. The Ellwood Motors Co. was formearly Kansas City representative of the car, but in the future will devote its entire time to the sale of Marmons, which agency it has had for some time.

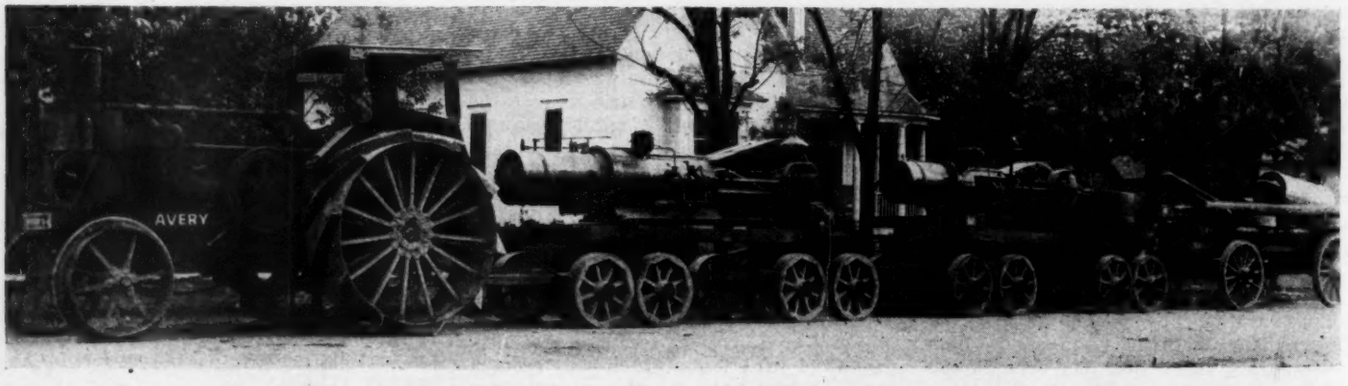
A distributing agency for the Stutz in 25 counties in central Ohio has been opened in Columbus, under the name of the Columbus Stutz Co.

Miller Bros., who for some time have handled the Mercer cars in the Toledo district, have added the Romer car to their lines.

The McIntyre Motor Sales Co., Kalamazoo, Mich., successors to the McIntyre Motor Co., are entering the engine manufacturing field with two four-cylinder power plants of 4½ by 6 and 3¾ by 5½ in. size respectively. The valves are of piston type operating in a sleeve inserted into the cylinder wall. The valves are driven by connecting rods from an eccentric shaft operated by a chain drive from the main crankshaft.

Automobile dealers at Keokuk, Iowa, have organized the Lee County Motor Trade Bureau affiliated with the Iowa Motor Trade Bureau which has its headquarters at Des Moines. Associations are being organized in various counties throughout the state and it is hoped to have a one hundred per cent membership by the end of the year.

The American Storage Battery Parts Co., manufacturers of brass and lead storage battery parts for battery manufacturers, jobbers and service stations have opened their new plant at 650 East 163d St., Cleveland. They have published a Bulletin No. 101-A, outlining their standard parts which can be had on request.



All tractors are not used for plowing or harrowing as this picture will show. In the above case an Avery tractor was called upon to transport over country roads two large steam engines which could not be hauled to their point of destination by the railroads soon enough